

JPRS 80648

23 April 1982

Worldwide Report

TELECOMMUNICATIONS POLICY,
RESEARCH AND DEVELOPMENT

No. 213



FOREIGN BROADCAST INFORMATION SERVICE

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VICTORIA COMPUTER REPORT TERMED KEY FOR LOCAL INDUSTRY

Canberra THE AUSTRALIAN in English 9 Feb 82 p 26

[Article by Claire O'Grady]

[Text] WHATEVER the government's decision on the critical report by the Victoria Computer Industry Advisory Group, one thing is clear and the fate of the local information processing industry will depend on it.

The Fraser Government's option to support Australian computer companies must rest in this 120-page study.

The Victorian Minister for Economic Development, Mr Jim Ramsey, who set up the study group last June, presents it for approval in six weeks' time.

"What the government is going to do is to see that its purchasing policies are designed to nurture the local industry and encourage it to improve, develop and compete," Mr Ramsey said.

"What the government is not going to do is to impose second best on the public sector."

What Mr Ramsey means by "second best" remains a mystery but to many Government boffins faced with tenders for a lucrative government computer contract, second best inevitably means Australian.

The report, which appeared last week in *The Financial Australian* has called for sweeping changes in the country's tax system — an extension of the capital gains tax to areas like property and the scrapping of undistributed profits tax for computer companies.

This, argues the report, would dramatically improve the financial climate for investment in high risk, high technology business.

Cash is crucial.

In his Australia Day speech to the nation, the Prime Minister, Mr Fraser, spoke in glowing terms of Australia's high technology base.

What he omitted to say was that the Australian market represents only 1 per cent of the total world market.

For a country which spends \$13.60 on imported computers for every dollar spent on Australian-made, the balance between overseas manufacturers and domestic ones is crucial.

The managing director of Melbourne-based Computer Manufacture and Design Pty Ltd and a member of the report's committee, Mr Damien Dunlop, stressed:

"The most powerful means available to government for encouraging the growth of the local computer industry is to purchase local products."

This point alone forms the nucleus of the study's recommendations, which are:

- SETTING up a small, high-powered government group, to be called the High Technology Implementation Task Force, to ensure that the report's recommendations are implemented.
- EXPLOITING current legislation to provide financial assistance.
- CHANGING the tax structure to ease the way for investment in high technology projects.
- MARRYING government aid to encourage local suppliers to export their products.

The report's chairman, Mr Trevor Robinson, said: "The attitude of this country seems to be that the sale of natural resources will keep us going for ever and

the only problem to be tackled is how to slice up the cake.

"The fact is (that) the environment for the computer industry in Australia is not yet suitable for the support of companies which need to grow, prosper and spawn other companies in the same business."

One of the major stumbling blocks to the growth of local hardware and software companies, besides money, is size.

The report gives the lie to the common belief in data processing circles that small is beautiful.

The study stressed: "Small companies in the US mostly cater to market niches: they specialise by providing innovative, high-quality products which cover minute bands of the total market spectrum."

"Such strategies make sense in the US where the market is some 50 times as large as it is in Australia."

"Over here the suppliers tend to fall between two stools: without a significant export component the market is too small for specialisation and not large enough to justify the big company approach to management, marketing, engineering production and customer support."

The managing director of mini-computer maker D.D. Webster Electronics, also in Melbourne, Mr Dave Webster, added: "Companies are forced to remain small because of the horrific tax

burden."

"We should be allowed to compete on the open market without having to be constantly looking at the tax implications."

"If DP companies are to become profitable, the correct environment has to be created."

Despite the constraints, D.D. Webster Electronics, a producer of DEC-based PDP-11 compatible machines, turned over \$1.5 million last year and is now looking to double that figure.

But unless financial constraints are lifted and attitudes change, the report warns that by the year 2000 Australia will be surpassed in GNP per head of population by Japan, Korea, Singapore, Hong Kong and other Eastern countries.

The main role of the government, it says, is to create an environment in which private entrepreneurs can build a self-sustaining industry capable of competing internationally.

If the government implements the report's recommendation and attempts to create the right environment to nurture local DP talent, companies may at last have the chance to grow.

At the end of 1978 there were about 11,000 computers installed in Australia and the average annual growth rate for computer system purchases has been estimated at around 20 per cent over the past six years.

ON-LINE TESTING OF TELECOM DIGITAL DATA SERVICE BEGINS

Melbourne THE AGE in English 9 Feb 82 p 28

[Text]

Two Melbourne companies are testing Telecom's new computer-communications service before its introduction in December.

DDS — Digital Data Service — allows computers to communicate without modems and will cut some charges for interstate leased-lines by up to 70 per cent. Some organisations presently spend up to \$2 million a year on data transmission.

Telecom's customer liaison manager (data division), Mr Brian Perkins, says the service will be used mainly by large concerns such as banks, big retailing chains, and possibly airlines — anyone with a large national network.

"The new service does away with modems and offers additional facilities that have not been possible before," says Mr Perkins.

The first, Netplex, allows multiplexing, which is the facility to merge signals from a number of

different locations into one digital stream before they are transmitted to a central computer.

"The great advantage is that this reduces the number of inputs to a central computer, and that's a cost saving," he says.

Using Netstream, another facility, large multi-line users are given discounted rates equivalent to the total of their individual line speeds.

For example, a company operating five 9600 bit-per-second lines are billed at the 48k-bit rate, which gives considerable savings — typically, up to 25 per cent.

The present tests, which 20 hand-picked companies will take part in this year, started in September last year. Last week's connecting of two companies live, is a significant step.

Coinciding with DDS's December launch date, Telecom will also launch its other much-talked about computer communications service — Austpac. It will replace Datel's exchange line service.

CSO: 5500/7526

COMMERCIAL TV STILL YEARS AWAY IN NORTHWEST AREAS

Perth THE WEST AUSTRALIAN in English 11 Feb 82 (News of the North) p 1

[Article by Geoff Milner]

[Text]

Many North-West coastal towns will be without commercial television for at least two years, according to a spokesman for the Department of Communications.

That is the earliest that residents from Carnarvon through to Onslow, Karratha, Dampier and Port Hedland can hope to receive an alternative to the ABC.

The four groups vying to provide the services and which have shown interest in applying for the commercial licence face a long process of overcoming technical, social and economic hurdles.

The Department of Communications spokesman said that the four tentative proposals by the companies were among 700 being considered by the department. Eighty of those were in WA alone.

The four companies involved are:

- The Mining Television Network, which operates eight stations in the North-West including a main station at Newman.

- Calpurnicus Pty Ltd, which has made the most detailed technical submission to the department.

- Pilbara Television and Pilbara Radio.

The last named companies have made only preliminary advances to the department till the Minister for Communications calls for

applications for a licence.

Proposals

The spokesman said that about five proposals for new or extensions to services were received by the department each week, creating a big backlog.

He could not see commercial television for the North-West going ahead any sooner because it had not achieved enough priority. There was also the long system involved in granting a licence.

However, the department planned to change the system later this year in a bid to speed up the consideration of technical problems which was a big stumbling block.

There was likely to be a change to facilitate quicker technical engineering consideration because the department intended to get companies proposing new services to appoint their own consultants to formulate draft planning proposals.

This job was now being done by the department and has resulted in the backlog.

However, the change is not expected to make much difference to the North-West commercial television pro-

posal.

The spokesman said that the best way of speeding up the process was by petitioning the Government, pressing local parliamentarians and getting mining companies to press for services.

Pressure

Political pressure was the surest way of moving the provision of commercial television in the North-West up the scale of priorities, he said.

The department after receiving draft planning proposals from groups such as Calpurnicus, determines a final technical plan and the Minister may then call for applications from companies to follow the plan, even though it may not be the same as the plans originally proposed by any of the companies.

The department sets out to make the best plan for the community regarding cost, ease of implementation and how many people to service.

Before the Minister calls for applications, interested industry bodies, including the Departments of Defence and Transport and the Federated Association of Commer-

cial Television Stations, will be asked to comment.

Applications to the Minister are then heard at a public hearing by the Australian Broadcasting Tribunal which may then grant a licence.

The Mining Television Network and Calpurnicus have been trying to win support from residents as they vie for the licence, in a bid to add weight to their applications when they are called.

The spokesman said that the department would consider local coverage and the viable methods of establishing the service.

Companies have applied to the tribunal to provide that coverage and use the department's recommended methods.

The MTN intends to establish a service using an existing cable line from its Newman studios with supplementing local coverage from Port Hedland and other towns which would be broadcast

throughout its viewing areas.

Calpurnicus wants to set up a main studio in Port Hedland with three booster transmitters at Dampier, Karatha and Roebourne to boost reception from those points.

Though Pilbara Television and Pilbara Radio have only made tentative proposals the spokesman said that they seemed to be as interested as the other firms.

SIDNEY GETS FIRST LOW-POWERED SUBURBAN FM RADIO GROUP

Sydney THE SYDNEY MORNING HERALD in English 15 Feb 82 p 1

[Text]

CANBERRA. — Sydney is to have Australia's first group of low-powered FM public radio stations — likened by the Minister for Communications, Mr Sinclair, to suburban newspapers.

The nine stations, to be operated by community groups, will have a broadcasting range of a radius of five kilometres.

Mr Sinclair announced yesterday that applications will be called soon for the licences for the public access stations — the largest group of permits yet offered under the community broadcasting scheme, and the first in the special low-powered Category C.

The stations will cover the following areas:

1. City of Sydney, Botany, Randwick, Waverley and Woolahra.
2. City of Sydney, Leichhardt, Marrickville and Botany.
3. Ashfield, Burwood, Concord, Drummoyne and Strathfield.
4. Marrickville, Canterbury, Hurstville, Kogarah and Rockdale.
5. Liverpool, Green Valley and Fairfield.
6. Ryde and Hunters Hill.
7. Ku-ring-gai, Willoughby, Lane Cove, North Sydney and Mosman.
8. Manly-Warringah.
9. Bankstown and Auburn.

The stations will introduce "neighbourhood radio" to Aus-

tralia for the first time.

A spokesman for the Department of Communications said yesterday there would be some overlap of the broadcasting areas, but it was not expected that the stations would interfere with each other.

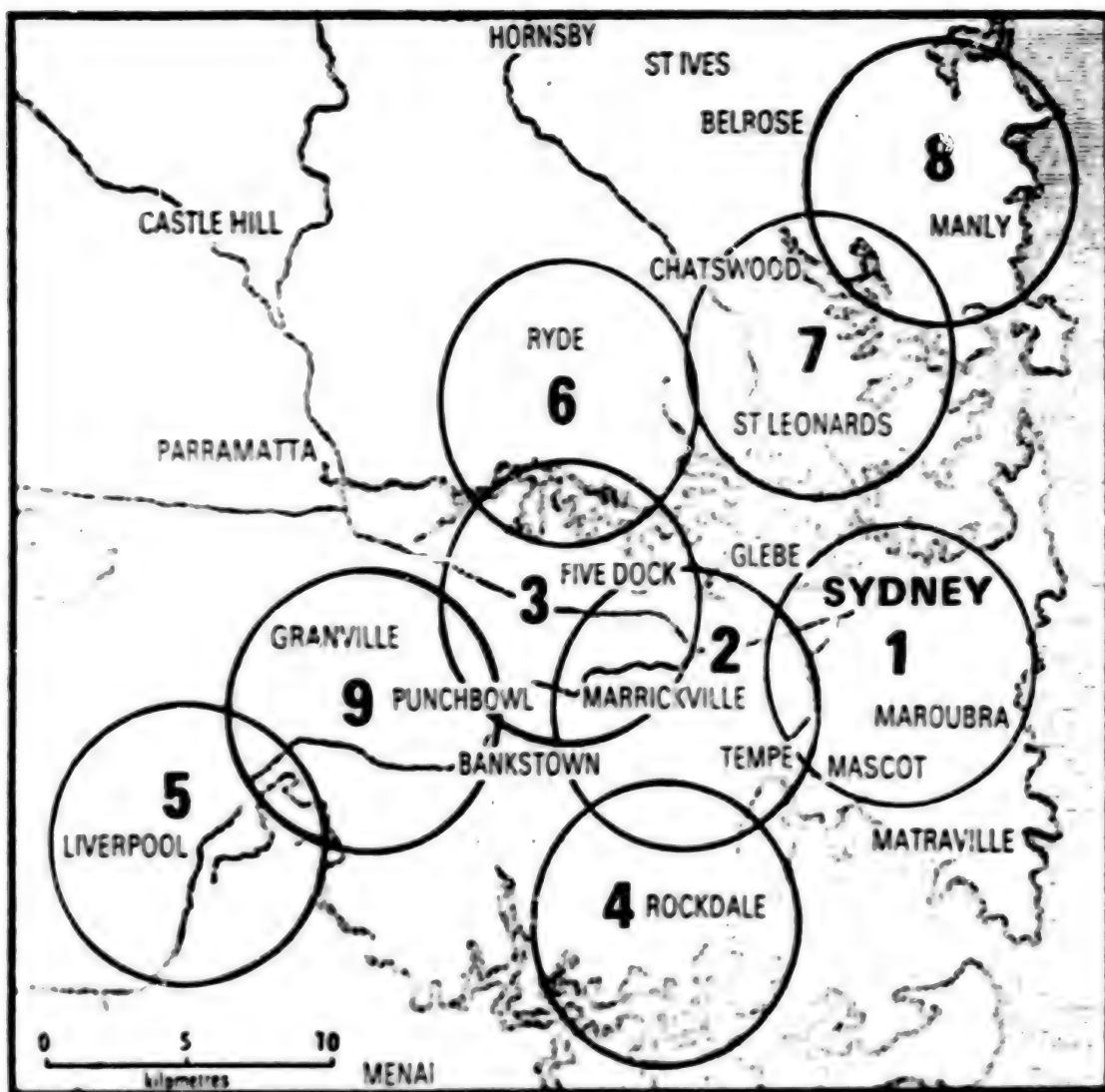
The Australian Broadcasting Tribunal will hold hearings into the licence applications later this year, but it is expected that the licences will go to existing community groups which participated in the formulation of the scheme by the NSW Public Broadcasting Association.

The existing groups thought likely to be granted the licences include the Sutherland Shire Council, which has been active in the public broadcasting area; a media co-operative in Manly-Warringah, made up of people interested in broadcasting; and the Narwee Baptist Church.

The stations will be self-funded. The low-powered transmission equipment is estimated to cost between \$10,000 and \$20,000.

Public stations cannot broadcast advertisements, but they are allowed to accept sponsorship. The station may broadcast the name and location of a company which sponsors it, but it may not give details of the company's product.

Other cities are likely to be granted the low-powered Category C Licences if the Sydney scheme proves a success.



The approximate broadcasting ranges of the nine proposed low-powered community FM stations in Sydney. The key is at left.

CSO: 5500/7526

AUSTRALIA

BRIEFS

HP-IL LINK--Hewlett-Packard Australia is set to launch a batter-operated digital multimeter which will provide a link-up between a calculator and a host computer. The new product, called HP-IL, which was relased in the United States earlier this year, now means that hand-held calculators like the HP 41, can interface with mainframes to convert to a portable computer. A company spokesman said: "We regard the HP-IL as one of the most important product releases for 1982. "It has immense significance for a wide range of users ranging from students to professionals and large corporations." Further details on the new product will follow its Sydney and Melbourne launches this month. [Canberra THE AUSTRALIAN in English 16 Feb 82 p 20]

CSO: 5500/7526

INDIA

NEW SATELLITE TO IMPROVE WEATHER FORECASTING

New Delhi PATRIOT in English 22 Mar 82 p 8

[Text] Bangalore, March 21 (UND)--Weather watching in the country will become more precise and swift with the launching of the Indian National Satellite (INSAT-IA) in another 17 days.

When it becomes operational, INSAT will be the fifth meteorological satellite in the world.

While it would improve the communications facilities in the country, its meteorological component will benefit agriculture, civil aviation, port and shipping operations, ocean fishing, hydroelectric power generation and irrigation planning.

The INSAT would help round-the-clock, half-hourly synoptic observations of weather systems including cyclones, sea surface and cloud temperatures. It would facilitate detection of tropical cyclones 12 to 24 hours ahead of other methods and half hourly picture mosaics of severe weather all over the country for better flight planning leading to fuel saving.

A greater precision in short-term and area weather forecasts, substantial improvement in medium and long range forecasts, availability of sea-surface temperature data for better monsoon forecasts and guidance to ocean fishing, frequent snow-cover pictures of the Himalayas important for evaluation of snowmelt contribution for regulation of reservoirs and irrigation and power generation would be other benefits of INSAT meteorological components.

The INSAT would carry very high resolution radiometer (VHRR) for the meteorological earth observation purposes.

The Indian Meteorological Department has set up the meteorological data utilisation centre (MDUC) at Delhi for processing the INSAT information on weather. The data would be received by the Delhi earth station of the Posts and Telegraphs Department and transmitted to the MDUC in real-time over a microwave link.

The Meteorological Department is also setting up 100 data collection platforms (DGP) over land and ocean which will collect data about meteorological and hydrological parameters and transmit the same to the satellite. The satellite receives the data in ultra high frequency band and transmits the same to the ground in the 4ghz band.

Over 100 disaster warning sets are being installed in the coastal districts for dissemination of warning of adverse weather.

CSO: 5500/7101

BRIEFS

BHASKARA SATELLITE CAMERA TROUBLE--Bangalore, March 20--One of the two television cameras of India's second earth observation satellite, Bhaskara II, now in an orbit for the past four months, has developed a snag and its operation has been suspended, reports PTI. The anomalous function of the camera operating in the visible band was noticed by the ISRO during its third cycle which started a few days ago. This had resulted in a reduced efficiency of the image generation and some degradation of the image in this camera and it was decided to operate only camera number two operating in the near infra red, an ISRO announcement said. The anomaly was under study for possible correction. Following problems encountered in the television camera of Bhaskara I its predecessor, modifications were effected in the configuration of Bhaskara II to eliminate the anomalies. The TV tube in the camera system was directly connected to high-voltage to eliminate "corona discharge" which caused the initial breakdown of the camera on board Bhaskara I. Bhaskara II had been functioning well, completing over 1,750 orbits since it was launched from the Soviet cosmodrome on November 20, exactly four months ago. The two TV camera system had also systematically imaged the Indian sub-continent, producing about 1,100 photographs in each of the two spectral bands and in the process covering the country twice in two successive cycles. The data gathered so far from the TV camera system have been converted into a variety of products for use in resource application studies such as hydrology, forestry, snow mapping, drought monitoring and land cover mapping. The microwave radiometer data are also being used to determine water vapour and liquid water contents in the atmosphere, study of the development of depression zones over oceans and ocean surface winds. These efforts are underway both within the ISRO at the space applications centre, Ahmedabad, and among various user agencies, the ISRO said. [Text] [Calcutta THE STATESMAN in English 21 Mar 82 p 1]

DELHI TELEPHONE PLANS--An ambitious programme has been chalked out to give an additional 47,000 telephones in Delhi during 1982-83. According to an official spokesman the plan also envisages another addition in 1983-84 when 16,600 more lines will be added. During the 1982-83 Delhi Telephones plans to expand the Karol Bagh, Tis Hazari and Shaktinager telephone exchanges with 10,000 lines each. The Janpath and of Hauz Khas exchanges will also be expanded by 1000 and 1600 lines respectively and 500 lines will be added to the Chanakyapuri exchange. During 1983-84 a 10,000 line capacity exchange is to be set up at Chanakyapuri and another 2,000 and 1000 lines are scheduled to be added in the Janpath and Shahadra East. Faridabad, Ballabhgarh and Bahadurgarh exchanges will be expanded by 1200, 1,500 and 900 lines respectively, the spokesman added. [Text] [New Delhi PATRIOT in English 22 Mar 82 p 10]

PAKISTAN TELEVISION UNABLE TO DIGEST SATELLITE FEED

Islamabad THE MUSLIM in English 30 Mar 82 p 1

[Article by Salim Bokhari: "PTV Cannot Digest Satellite Feed"]

[Text]

ISLAMABAD, March 29. The news network of Pakistan Television Corporation is not visual-oriented and even if the arrangements are made to receive the daily satellite feed, 10 per cent of the stuff will not be used since it will not be in line with our national policies and people's aspirations, a reliable PTVC source said here today.

Another reason, the source said, was that the mass media like radio and television in our country were "biased journalism" and it was not possible for the PTVC authorities to deviate from the given lines. Moreover, the international news coverage by the Western agencies was biased and highly influenced by the Jewish lobby.

Last year, he said, the international satellite announced free daily feed for under-developed countries particularly in South-West Asia on a three-month experimental basis. The offer was accepted by several countries including Bangladesh. He said Pakistan did not accept the offer because it could not afford the down leg expenditure. The down leg expenditure, it may be noted, in certain cases was more than the total production cost of the event covered by the host country.

In this connection on several

occasions, the United Nations and the Asian Broadcasting Union had requested Pakistan Telephone and the Asian Broadcasting Union had requested Pakistan Telephone and Telegraph Department to reduce its rate but the T&T had expressed its inability to do so.

Replying to a question as to why the live telecast of international competitions like squash, won by young Pakistani star Jehangir Khan were not arranged, the source said it was again because of heavy funds involved in it and added, you will be surprised to know that the host country was not covering the event even for its national television network. He said an independent sports organisation covered the event from which later the recording was purchased and telecast in the country.

A telecast of the recording of such events cost much less, the source said.

On the other hand, the source claimed, PTVC was the fastest in the world for news coverage. "There are instances where the PTV was the first to telecast international events. But it is only possible where a PTV team is present. The source cited the example of President Ziaul Haq's visit to the United States and said immediately after the first round of talks between the two sides was

over, the visual was telecast in Pakistan.

The source further disclosed that India was planning development of television network in a big way and has recently ordered 640 video-tape recorders and 20 outdoor broadcasting units (mobile vans). He said all this was being done under the Asian Games coverage. On the other hand in our country PTVC has only 30 VTRs and four OBUs and it was high time that the government considered the issue and allocated funds to develop the television network.

He said India had planned opening of several new television stations across the border. It seemed as if Indians were planning a new cultural invasion of Pakistan, the source said and added, in 1976, with the induction of Amritsar Television Station PTVC lost a large number of viewers. "What will happen if there were 10 or more such TV stations?" he asked.

When asked to comment on a report that a list was being prepared to reduce the number of employees in the PTVC, he said there was no such list and added some time back the concerned Ministry was planning to reorganise the PTVC but later the idea was dropped. There should be no panic among the employees of the PTVC on this count, he stressed.

PEOPLE'S REPUBLIC OF CHINA

CURRENT STATE OF TV TRANSMISSION BY SATELLITE STUDIED

Shanghai DIANZI JISHU [ELECTRONIC TECHNOLOGY] in Chinese No 12, 81 pp 1-4, 10

[Article by Wang Wengi [3769 2429 7496]: "Progress in Direct Satellite Transmissions"]

[Text] The broadcast satellite used for telecasts is one kind of telecommunications satellite. The direct telecast satellite is a further development of the broadcast satellite. Its transmitting power is some several hundred watts. Individual household receivers on the ground can use small antennas about 1 meter in diameter to directly receive and view television broadcasts.

Compared to surface television broadcasting, direct telecasts by satellite have the following two advantages: First, the area of coverage is large and the investment is small. For example, the service radius of ordinary television stations is about 40 kilometers, covering about 5,000 square kilometers. If such television stations are used to cover such an expansive area as our nation, 2,000 television stations are needed and several times this number of relay stations have to be set up. All these require a very sizable investment of manpower, materials and capital. On the other hand, one direct broadcast satellite can cover the entire area of China, as shown in Figure 1. Second, the quality of the telecast is high. This is because direct telecast satellites use frequency modulation and avoid deterioration of image quality through multiple retransmissions. At the same time, the satellite is located at the altitude of synchronous orbit (35,786.04 kilometers in space). The angle of incidence of electrical waves is large and the effect of mountain peaks and tall buildings is small. In this way, even in remote mountain villages or behind skyscrapers in large cities, good quality telecasts can be received. Its main shortcoming is that it requires a one-time concentrated investment.

Since May 1974, when the United States launched the "applications technology satellite-6" (ATS-6) to conduct satellite broadcast experiments, Canada, the Soviet Union and Japan have followed by launching experimental broadcast

satellites successfully⁽¹⁾. Many countries of the world have also drawn up plans for launching broadcast satellites. For example, in October 1979, France and Germany decided to jointly develop a pair of direct broadcast satellites and drew up a plan to launch an experimental "direct broadcast satellite" in 1983 and another operational "direct broadcast satellite" in 1984. Luxembourg and the Scandinavian nations, Italy and India are also actively studying such satellites. A "broadcast satellite craze" has emerged in the world.

1. The Operating Frequencies of the Direct Broadcast Satellite

The International Telecommunications Union (ITU) assigned the operating frequencies for broadcast satellites for the first time in 1971 at that year's World Amateur Radio Conference (WARC). Now, the frequencies used by broadcast satellites include 700 to 800 MHz, 2.5 GHz and 12 to 14 GHz. The present experimental broadcast satellites and the direct broadcast satellites of the 1980's will mostly be operating within the 12 to 14 GHz range. This has the following advantages:

1. These frequencies are seldom used for surface communications, so the antennas of ground stations can be installed on top of buildings in downtown areas.
2. The width of the 12 to 14 GHz beams of ground station antennas of similar dimensions is smaller, so when there is no interference, the number of satellites allowable in synchronous orbit can be increased.
3. Satellite antennas of fixed weight have better directionality than lower frequency antennas.
4. Satellite antennas of fixed dimensions with a gain of 12 to 14 GHz are an improvement over the 4 to 5 GHz antennas used by ordinary telecommunications satellites by 16.9 decibels. See Figure 2. This improvement can be used to compensate for absorption and increases in noise caused by bad weather. It also enables the antennas to be made smaller and reduces the cost of the antennas.
5. To avoid interfering with ground surface transmissions, the power of downward transmission in other frequencies is limited, while at 12 GHz there are no limitations.

¹ Canada launched a "communications technology satellite" (CTS) in January 1976; the Soviet Union successfully launched Fluorescent Screens No 1 in October 1976 and No 2 in September 1977; Japan successfully launched the BSE experimental broadcast satellite in April 1978.

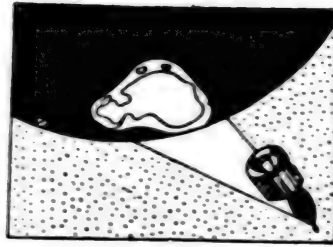


Figure 1. Direct broadcast satellite and its area of coverage.

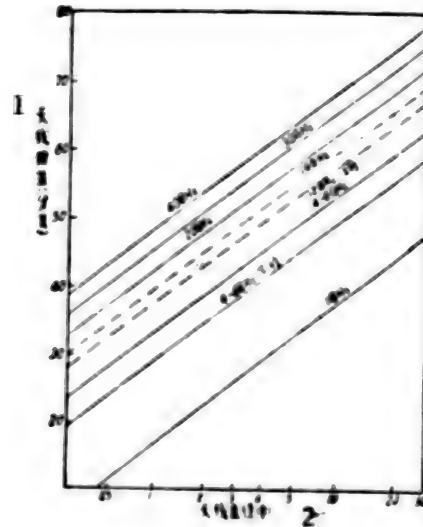


Figure 2. Antenna gains under different frequencies.

KEY: 1. Antenna gain (decibel)
2. Antenna diameter (meter)

6. The bandwidths of the usable frequencies are wider.

The main shortcoming of the 12 to 14 GHz frequencies is that loss and noise during thunderstorms and in heavy fog and overcast weather are large. Figure 3 shows the relationship curve between frequency and loss and noise.

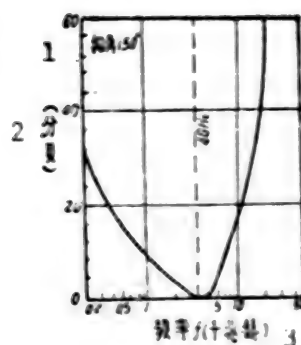


Figure 3. Loss and noise (at an angle of refraction of 15°) caused by heavy rain, heavy fog and overcast weather at different frequencies.

KEY: 1. Tilt of 150
2. Decibel
3. Frequency f (GHz)

II. Technology of Beam Shaping

A microwave directional antenna generally uses a reflector to focus beams. For example, the Intelsat-4 (Intelsat-IV) has two reflectors. The power from the transmitter is passed through a horn antenna reflector in the direction of transmission to form a cone beam. At reception, the energy of the signal of the reflector in the direction of transmission is focused and sent to the antenna feed.

In a domestic satellite system, the shape of the beam from the satellite should coincide with the requirements for domestic service. If the territory of this country is narrow and long or bent and irregular in shape, then this is even more important. By concentrating all the energy that can be utilized to direct the beams to areas entirely within the territory of this nation, the satellite can be smaller in design and the cost of transmission will be relatively cheaper. For example, although the WESTAR satellite is lighter than that of the Intelsat-IV satellite by more than half, it rebroadcasts more telephone channels. This is because it uses shaped beams.

Making the shaped beam and the shape of the territory of a country consistent is partly accomplished by the antenna reflector, but mostly it is accomplished with the help of a multiple feed horn which directs the signals toward the reflector. Figure 4 illustrates the function of the multiple feed horn. Again for example, the Intelsat-V satellite uses 88 feeds and one 2.44-meter reflector. Each feed produces one spot beam. Through the feed network, these spot beams can be placed at any amplitude and phase. Their composite beam can reach any covered area in one hemisphere.

III. The SHF Changer in Direct Television Broadcast by Satellite

As the technology for high precision attitude control and the technology of high power travelling wave tubes for direct television broadcast by satellite are solved, the receivers of direct television broadcasts by satellite have

become a realm of fierce international competition. In Western Europe, Japan and Canada, there are at least 22 companies which are developing prototype receivers. Although the United States has superior technology in the television industry, it lags behind in the development of small receivers.

The individual household receiver for direct television broadcasts by satellite consists of an indoor unit and an outdoor unit (see Figure 5). The outdoor unit consists mainly of a stepdown frequency changer. The indoor unit consists mainly of a frequency tuner and a modulated frequency demodulator as the central units. A dish-shaped roof antenna of 1-meter diameter receives the super high frequency (SHF) signals from the direct broadcast satellite. (For example, Japan uses 11.95 to 12.13 kHz super high frequency signals). The signals are sent to the stepdown frequency changer and after passing through the frequency changer, the SHF signals are transformed into the first medium frequency signals (for example, 290 to 470 MHz). The medium frequency signals pass through a coaxial cable and enter the indoor unit's tuning circuits, which change the first medium frequency signals into the second medium frequencies (such as 130 MHz). The tuning circuit generally consists of a narrow-band first medium frequency amplifier and a second self-oscillator. After the signals pass through the band pass filter, interference from nearby channels is reduced. Noise from frequency modulation is eliminated in the limited amplitude amplifier. Finally, the signals are processed by the modulated frequency demodulator and sent to the ordinary television set.

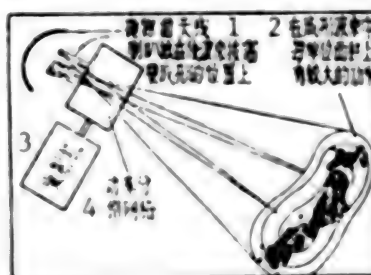


Figure 4. Multiple feed shaped beam has a coverage area consistent with the shape of the country.

- KEY: 1. Parabolic antenna
 The horn is placed at a position to shape the beam as required
 2. The shaped beam has more power per unit area
 3. Emitter
 4. Power and phase separation network

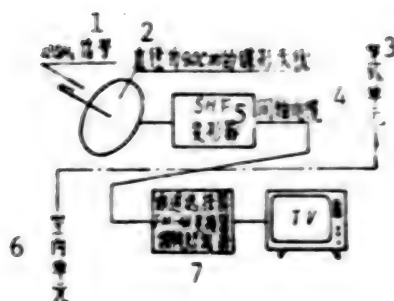


Figure 5. Composition of the household receiver of direct satellite broadcasts.

- KEY:
1. Signal
 2. Dish antenna of 90 cm diameter
 3. Outdoor unit
 4. Coaxial cable
 5. SHF changer
 6. Indoor unit
 7. Tuner, FM-AM converter, modulated frequency demodulator

One of the key components of the television receiver of direct satellite broadcasts is the SHF stepdown frequency changer. Whether its performance is good and its cost is low will determine whether direct television broadcast by satellite is practical and whether it can be popularized, so all companies are competing to develop it. There are many types of SHF changers, but basically they can be classified into two types. One is the mixer-stepdown frequency changer. The other is a microwave integrated SHF changer with a field effect tube (FET) amplifier as the front end device. They are described separately below.

1. The SHF Changer Using the FET Amplifier as the Front End Device

The frequency changers manufactured by Sony and Phillips are representative of this type. Figure 6 shows an example. It includes a bipolar gallium arsenide FET front end amplifier, a gallium arsenide Schottky potential hill diode mixer, a single silicon chip integrated-circuit medium-frequency amplifier, and a gallium arsenide FET oscillator. The gallium arsenide FET amplifier uses a field effect tube with a grid 1 micrometer in length and 30 micrometers in width. Before designing the amplifier circuits, the S parameter of the core of the FET tube was measured by the automatic network analyzer. The amplifier circuit was obtained by calculation using values of the S parameter actually measured by the microwave circuit analyzer program of OPNODE. The computed values and the actual characteristic values of the bipolar amplifier were very close. The results of measuring 22 samples showed the range of noise was between 3.7 and 4.7 decibels and the gain was between 12.5 and 16.1 decibels.

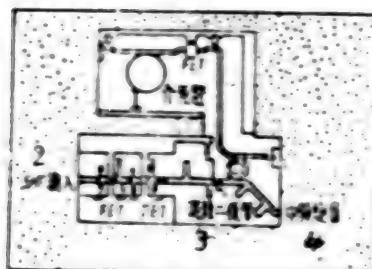


Figure 6. Example of microwave integrated SHF changer.

- KEY: 1. Medium cavity
2. SHF input
3. Diode mixer
4. Medium frequency output

The mixer uses single end frequency mixing. It uses a directional coupler at the self-oscillating input terminal. At the radio frequency input terminal is an open loop short-circuited stub filter. It is used to match the signal frequency and the attenuating mirror image frequency, relative signals and self-oscillation. It produces over 20 decibels of attenuation. Mirror image retrieval is realized via a two-section open-loop short-circuited stub filter. The mixer uses an unsealed Schottky potential hill diode. The mixer's smallest loss in frequency change is 5 decibels, and the loss within the entire frequency range is less than 5.5 decibels. The suppression of the mirror image reaches beyond 18 decibels. This diode mixer will soon be replaced by a double-grid gallium arsenide FET.

The self-oscillation of the SHF changer is generated by a direct oscillator. Solid state devices which can directly produce oscillations are the IMPATT diode, the body effect diode and the FET. Because the designed circuits must be simple, must have a high oscillating efficiency and must be suited to mass production, the FET oscillator is used here. When designing the oscillator, the OPNODE computer program is still used to obtain the maximum negative resistance and the optimum impedance related to FET leak and source. Oscillation is produced by negative resistance. After frequency stabilization in the cavity of the medium, the measured degree of stability of frequency within a temperature range of -20°C to $+50^{\circ}\text{C}$ reached ± 500 kHz.

The characteristics of each step of the single silicon chip integrated circuit are as follows: Within the frequency range of 50 to 500 MHz, the gain is not less than 10 decibels and the noise coefficient is smaller than 2.5 decibels. The frequency changer uses four steps of such amplifiers. The SHF changer is installed inside an aluminum box with a biasing circuit. Its smallest noise coefficient is 4.1 decibels, as shown in Figure 7. Table 1 lists the designed data of the frequency changer. Its power loss is 2.4 watts. Its weight is only 150 grams. The relationship between the quality of the image S/N (signal-noise ratio) and the diameter of the antenna is shown in Figure 8. When using a frequency changer with a noise coefficient of 4.5 decibels to produce an image with S/N-45 decibels, the antenna gain

must be 39 decibels. If the effective specifications of the antenna have a 55-percent efficiency, this would be equivalent to a parabolic antenna with a 93 cm diameter. If this frequency changer is connected to an antenna with a 60 cm diameter, the S/N of the quality of the image is estimated at 41 decibels. These estimates have already been proven by actual reception experiments.

The present FET devices already possess good low-noise characteristics, such as the NEC 388 which has a noise coefficient of 2.7 decibels at 12 GHz, and the Matsushita 1403 FET which has a noise coefficient reaching 1.7 decibels at 12 GHz. As FET manufacturing technology develops, the noise coefficient at 12 GHz using a 0.3 micrometer grid is expected to drop to 1.2 decibels, and a unit price less than \$0.50. Thus it is possible to manufacture low priced receivers. Based on an annual production of 100,000 individual receivers of direct television broadcasts by satellite, the unit price would be between \$160 and \$1,000, depending on the requirements of the antenna, the bandwidth of the system and accessory equipment.

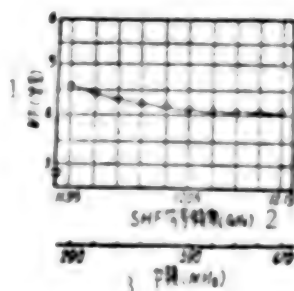


Figure 7. The N_F of the frequency changer is relatively flat within the entire range of the satellite frequencies. The maximum does not surpass 4.6 dB.

- KEY: 1. Decibel
2. SHF signal frequencies (GHz)
3. Medium frequency

Table 1. Design Data of the Frequency Changer

Characteristics of the gallium arsenide FET (12 GHz)		
S_{11}	0.593	-146.2°
S_{12}	-22.99 dB	114.6°
S_{21}	1.11 dB	52.9°
S_{22}	0.693	-55.0°
Stabilization factor: K		1.73 (stable)
Smallest noise N_F min		3.9 decibels
$\Gamma_s(N_{Fmin})$	0.529	143.4°
PG		7.6 decibels
NF (when $\Gamma_s = 0$)		5.8 decibels

Equivalent noise resistance	26.0 ohms
Input matching gain	1.88 decibel
Output matching gain	2.84 decibels
Maximum unidirectional gain	5.83 decibels

Radio frequency filter characteristics (mixed frequency level)

Signal frequency band insertion loss	1.5 decibels
Attenuation of self-oscillating frequency	8.5 decibels
Attenuation of mirror image frequency	20-25 decibels

General characteristics of the microwave integrated frequency changer

Input frequencies	11.95 - 12.13 GHz
Medium frequencies	290-470 MHz
Self oscillating frequency	11.66 GHz
Noise coefficient	4.1 - 4.6 decibels
Gain	50 decibels
Stability of self oscillation (-20 - +50 °C)	+500 kHz
Power loss	12 volts, 200 milliamperes, 2.4 watts
Dimensions	54 x 36 x 50 millimeters ³
Weight	150 grams

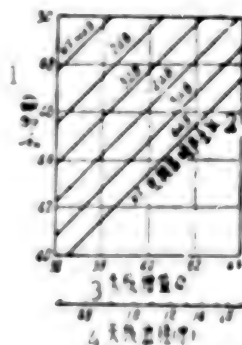


Figure 8. Relationship between S/N image quality and gain G of the antenna under different N_F .

KEY: 1. Decibel
 2. Noise coefficient of frequency changer
 3. Antenna gain G
 4. Diameter of antenna (meter)

2. Mixer-Stepdown Frequency changer

Figure 9 shows a planar view of the three-dimensional circuit of the mixer-stepdown frequency changer. Structurally, it is a circuit board inserted in the waveguide connected to the receiving antenna. The board contains a band pass filter, a self-oscillator and a frequency mixer. This type of metallic circuit board can be produced by punching and cutting and is

easy to produce in batches. The cost is low and its noise coefficient is 4.5 to 5 decibels.

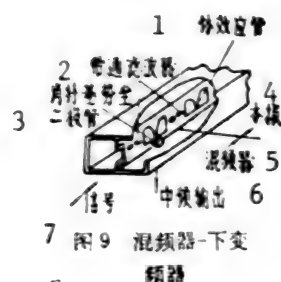


Figure 9. The mixer-stepdown frequency changer.

- KEY: 1. Body effect tube
2. Band pass filter
3. Shottky potential hill diode
4. Self-oscillator
5. Mixer
6. Medium frequency output
7. Signal

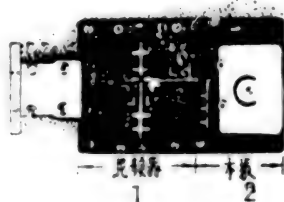


Figure 10. An SHF changer on a polytetrafluorethylene board.

- KEY: 1. Frequency mixer
2. Self-oscillator

Recently, a ground surface SHF broadcasting system has been developed. It can also be used as the SHF changer in a satellite direct broadcast system. Its structure is shown in Figure 10. It consists of a mixer, a self-oscillator, a UHF amplifier and a parabolic antenna with a 40 cm diameter. It has the following major characteristics: First, it uses microwave integrated circuit technology and places the mixer and the self-oscillator on the same polytetrafluorethylene board. The purpose is to reduce cost. Second, when injecting a low self-oscillation, the mixer has a low loss frequency variation and a high mirror image suppression ratio. When used as a parallel coupled band rejection filter in a single terminal mixer, it resonates with the signal, the self-oscillation and the mirror frequency respectively. Third, it has a highly stable self-oscillation. The oscillator uses a gallium arsenide FET with a grid length of 1 micrometer and a high Q medium cavity. To

eliminate the effects of the external feedback circuits, it uses a leak grounded oscillator. Table 2 lists the performance of this frequency changer.

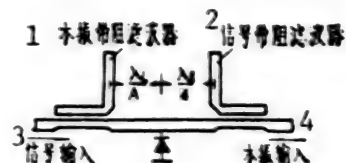


Figure 11. Basic frequency mixing circuit.

- KEY: 1. Self-oscillation band rejection filter
 2. Signal band rejection filter
 3. Signal input
 4. Self-oscillation input

Table 2. Performance of the SHF Changer

Item	Performance
Range of signal frequencies	12.092 - 12.20 GHz
Range of output frequencies	662 - 770 MHz
Self-oscillation frequency	11.430 GHz
Noise coefficient	< 8 decibels
Gain	> 30 decibels
	< 0.5 decibel within the channel
Fluctuation of gain	< 3.0 decibels in the frequency band
Mirror Image suppression ratio	> 17 decibels
	+150
Drift of self-oscillation frequency	< kHz
	-300
Total weight	1.5 kilogram
Power loss	< 1.5 watt

The frequency mixing circuit is shown in Figure 11. The signal and self-oscillation are injected via the microwave band lines at the two ends. A diode is connected to the upper end at the center of the line. The self-oscillating frequency parallel coupled band rejection filter is placed on the self-oscillating signal input line at a distance of one-fourth the wavelength of the signal from the diode. Similarly, the signal frequency parallel coupled band rejection filter is placed on the self-oscillating signal input line at a distance of one-fourth the wavelength of the signal from the diode. The signal input line (self-oscillation input line) of this type of structure is used to lead the self-oscillation power (signal power), so the self-oscillation power (signal power) can be very effectively fed to the diode. The medium-frequency short circuit consists of the short-circuited stub circuit and a plate capacitor. The mirror frequency band rejection filter is placed on the self-oscillating signal input line and the signal input line in the medium-frequency short circuit. The total noise coefficient

of the mixer and the UHF amplifier ($N_F = 2.2$ decibels, $G = 38$ decibels) is less than 8 decibels, and the total gain is larger than 30 decibels. See Figure 12.

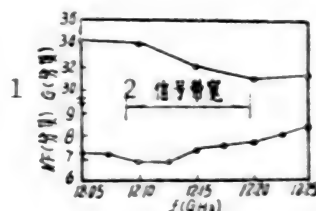


Figure 12. Performance of the frequency mixer.

KEY: 1. Decibel
2. Signal bandwidth

The actual FET oscillating circuit is shown in Figure 13. The circuit is placed on a polytetrafluorethylene board. Under high frequencies, the leak passes through the one-fourth wavelength short-circuited stub and is grounded. The source and the output lines are connected. The bias circuit is composed of a low pass filter connected through an autbiasing resistor R_S . The grid circuit consists of harmonic circuits composed of the medium cavity. The main composition of the medium cavity is titanium dioxide (TiO_2). The dimensions are $4.6 \times 4.6 \times 4.2$ (millimeters). The dielectric constant $\epsilon_r = 28$, the no-load value Q is 400. The FET oscillator operates stably within a range of 2 to 10 leak voltage.

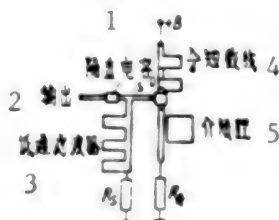


Figure 13. FET oscillator.

KEY: 1. Insulated direct current capacitor
2. Output
3. Low pass wave filter
4. Short-circuited stub
5. Medium cavity

The external shape of the frequency changer is shown in Figure 14. The mixer and the oscillator are both placed on a $56 \times 90 \times 0.6$ (millimeter) polytetrafluorethylene board. The UHF amplifier is placed on the back of the board. The input circuit consists of the WRJ 120 waveguide. It is connected directly to the signal input terminal of the frequency mixer. The frequency

changer is sealed in a water-proof box and is directly connected to a parabolic antenna with a 40 cm diameter. The total weight of the frequency changer including the parabolic antenna is about 1.5 kilograms. Its power loss is less than 1.5 watts.



Figure 14. The SHF changer and parabolic antenna assembly.

Besides the two types of front end receivers, some people have begun to study a front end receiver made of gallium arsenide single chip integrated circuits. The basic idea is to place a source device on a gallium arsenide single chip and to couple it with the medium cavity via a lead wire. Although at present we cannot predict the exact date of success--perhaps in 1983--the first gallium arsenide single chip integrated front end receiver will emerge, but some people estimate that it will be after 1985. We can say that it is still 10 years away from mass production.

It has only been a little over 20 years since man first received radio signals retransmitted from space by an artificial earth satellite. During this short period of a fifth of a century, telecommunications and broadcasting have undergone tremendous changes as space science and technology and radio electronics developed. The practical use of telecommunications satellites in the 1960's developed into experimental direct television broadcasts by satellites in the 1970's and to practical direct television broadcasts by satellites in the 1980's. The power of transmission by satellite increased from several dozen watts under several hundred MHz to several hundred watts under 12 kHz. The large ground stations with antennas 18 stories high, a diameter of 20 to 30 meters, weighing several hundred tons and requiring huge investment costs have developed into today's small front end receivers and antennas with a diameter as small as 0.6 meter, weighing only several kilograms, and capable of being set up in empty spaces behind offices and factory buildings or on the rooftops of houses. We can say that the time of using small antennas to receive television programs coming directly from satellites is not far away. An important topic in the practical use of direct television broadcasts by satellites is the production of receivers that perform well and that are low in cost. Therefore, many nations are developing such receivers competitively. At present, the following two front end receivers are most commonly used: the frequency mixer/stepdown frequency changer and the mixed and integrated SHF changer using the FET amplifier as the front end device. People are also engaged in research and development of single chip integrated circuits.

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TOTH ON DEVELOPMENT OF POSTAL SERVICES

Budapest NEPSZABADSAG in Hungarian 13 Mar 82 p 5

[Interview with Illes Toth, director general of the Hungarian Post Office, by Gyula Fejer: "On Improvement of the Postal Services"]

[Text] The emotions that have prevailed around the post office for decades, are abating--not because public opinion is accepting that service as it is. But, at any rate, it is trying to accept the fact that without large financial investments its quality cannot be improved significantly. And the post office is doing its work, with some big stumbles at times. Each year it delivers 800 million letters, packages and telegrams; it gets 1.3 billion newspapers and magazines to the subscribers; on its telephone network it handles almost 2 billion local and long-distance calls; and it relays radio and television programs.

Thus the whole country is its customer: the population, the enterprises, as well as the institutions. The postal service is a factor that influences the general well-being and the operation of the economy. How good is the postal service's work, and how good will it be? This is what we discussed with Illes Toth, director general of the postal service.

[Question] What is your opinion of the quality of services offered by the postal service?

[Answer] By European standards, the broadcasting of radio and television programs is good, traditional postal work is adequate, while our telephone service is poor, most of the central offices and the network are too old and overloaded. Even though the postal service received and is receiving larger funds from the state during the time periods of the Fifth and Sixth Five-Year Plans than previously for improving telephone service, in comparison with our earlier position we have still fallen on the list of European countries.

The Information Does Not Get Through...

[Question] How much money would be needed to effect fundamental changes in this situation?

[Answer] Several calculations have been prepared. These describe the growth of the postal service to the turn of the millennium. The most favorable decision would be a sum of about 160 billion forints. We would spend 117 billion of this to modernize the telephone network completely and would be able to install 2 million new phones. There are 11 telephones per 100 people, but with the long-range developments this number would increase to 30.

[Question] Is there any hope at all that the postal service will ever receive such a large sum?

[Answer] Yes, there is. But several decades of backwardness cannot be made up from one plan period to the next. By the turn of the millennium we will have caught up in development. We may consider the Council of Ministers resolution that accepted the long-range concept of developing the postal services and communication and authorized the National Planning Commission to put the plans in their finalized form, as the guarantee for this. This year the National Planning Commission has the development of the postal services on its agenda. The decisionmakers have adequate information about the postal service. Thus, we trust that we will be given the job so that the postal service and the telephone network can be brought by the turn of the millennium to the general level of development of the national economy.

[Question] Thus, today it falls short of it. What is the telephone situation in this country?

[Answer] As we used to say just among ourselves, the telephone quietly and slowly is strangling the national economy. The information does not get through, hinders production and makes it more expensive. Only about 43 of every 100 calls made in Budapest were successful; that is, the calling party was able to make connection. The international practice considers the percentage of successful calls between 30 and 60 to be acceptable; thus, ours is just barely over the lower limit. By the end of the present plan period, we want to raise this percentage to 46 or 47.

[Question] The long-range developments will hopefully bring substantial improvement. But until then, what is the most urgent task?

[Answer] By all means, it is the use of existing telephones. For this end, we are spending an increasing ratio of our financial opportunities for reconstruction. This means that we can connect fewer new telephones than in the previous 5-year plan periods. The basic problem of the Hungarian telephone network is that more than half of the subswitchboards operating at the enterprises and institutions are technically worn out; maintaining them is practically impossible. But these handle 63 percent of the traffic. This is a problem for the postal service as well as for the enterprise, because, four, five, or perhaps even more attempts must be made before a conversation can be held. This shoe is very tight. We do not have enough money to replace these subswitchboards during the Sixth Five-Year Plan. The postal service and the enterprises and institutions should join forces, since it is also in their interest to speed replacement of the subswitchboards; their financial sacrifices would probably soon be recovered.

[Question] Almost 300,000 people in this country are waiting for telephones. Thus, the number of people requesting service is not decreasing. But the amount of money intended for investments is decreasing all over the country. If this is also the case at the postal service, can we expect a continued increase in the number of applicants?

[Answer] We are very pleased that our growth opportunities are not the same as those of the national economy. While investment is stagnant in other areas of the national economy, and even decreasing in [some] areas of the Ministry of Transportation and Postal Affairs, the postal service received 29 percent more money for investments than in the last 5-year plan. This is one of the reasons for being optimistic; that is, the recognition and understanding of the situation of the postal service are expressed in these percentages. And yet, less money is available for new telephone stations because more must be spent on reconstruction. We must break with past practices because if we fail to renew the existing network it will return to take its revenge.

[Question] Many people feel that the telephone is too expensive.

[Answer] A new telephone costs the postal service 57,000 forints. This is not inexpensive! The constantly increasing reconstruction is also included in this. The user contributes only a part of the costs with the installation fee and the rate charged for telephone calls; the state pays most of the costs. Since the population pays only 10 percent, public entities pay about half of the total costs. If we want faster growth, a new situation must be created in carrying the costs also, which the economists used to call self-financing.

[Question] How can the telephone, and the postal service in general, be made self-financing?

[Answer] Prior to increasing the rates, the traditional postal fees did not even cover the costs of the service. The situation has become more favorable. Now all three of our major service branches can cover their operating costs from their income, and there is even some money left for development--of course, not nearly enough to be able to make up for the backwardness, nor even sufficient to satisfy the present needs. Even today we get one-third of our money for development from the state's contributions. A different distribution of the costs would be necessary between the state and those who use the services. The most easily bearable avenue to self-financing is the users contributing to the development program by higher tariffs. This is advantageous to the telephone owner because he gets better service and is advantageous to the telephone owner because they will get telephones sooner. The countries that have dynamically improved their networks, have done the same thing. And when they reached a high level of development, they reduced their rates; that is, the use of the telephone became less expensive.

[Question] In these countries the technology of the telephone is far ahead of ours. Thus, for example, electronic switching centers are being used in many countries. Will we also have them?

[Answer] Yes, we will. Budavox [Telecommunication Foreign Trade Company], BHG [Beloianisz Telecommunication Equipment Factory] and the postal service have announced the acceptance of competitive bids, with final evaluation of this spring. Hungarian industry will purchase a family of electronic switchboards and manufacture them for domestic use as well as for export. The National Planning Office has approved this program and has even made it possible for the Hungarian postal service to buy a sample electronic switching station.

The Complaints Are Justified...

[Question] But even until then, quite a few things need to be done urgently. For example, when will there be more working public telephone stations?

[Answer] The postal service considers these to be truly the telephones of the people, of all those who have no other way of making phone calls. Thus, it is important to expand and improve the public telephone network as soon as possible. In Budapest we basically want to put our public telephone network in order by the end of the plan period, with an investment of 170 million forints. In the districts this program will also be completed by 1985. In Budapest we will install 1,000 new public telephones in public places by 1985, and an additional 500 in coffeehouses and tobacco shops. We are installing even more than this--1,800--in the provinces. People are justified in their complaints that noise prevents conversation on the telephones located in the so-called bird cages on the Korut [Boulevard] even if the telephone works. Therefore, we are not only replacing the existing, several-decades-old phone booths, but these public telephone stations will also receive new booths. I admit that the equipment often does not work. We want to solve the problem so that the phones themselves indicate when they are out of order. Several innovations have been made to accomplish this; the postal service's technical experts will soon install the most useful one.

The population can also be very helpful to the postal service. Last year in Budapest alone, vandals caused 4-million-forints worth of damage in the telephone booths. We could have installed quite a few new telephones for this money. And the damage generated when ambulance, doctor or policemen cannot be called because of a damaged telephone is simply incalculable.

[Question] Let's switch to a more pleasant topic. In everybody's opinion, wireless telecommunication is the best service provided by the postal service. In spite of this, many people still cannot receive television's second program [station] and at times have poor reception of Radio Petofi's program. [Translator's note: Radio Kossuth is program No 1] What does the postal service promise to them?

[Answer] Even though our country is a small one, we have 12 transmitters operating on VHF and 31 on UHF. Television's program 1 is transmitted by 54 transmitters, program 2 by 21. The postal service can promise further improvement in this branch of service also. We are placing additional transmitters into operation to serve areas without coverage; on the other hand, together with the management of the radio station, we are planning to have the

program of Radio Petofi run 24 hours beginning in 1983. One year later the broadcast of a local program for Budapest's residents will begin on UHF. Finally, our biggest job is to improve the reception conditions of Radio Petofi's program on the middle wavelength [VHF]. The new transmitter on Lakihegy will help do this and we are also making preparations for installing another one in Marcali. It will begin operation during the next 5-year plan.

We Are Building 80 New Post Offices

[Question] There are many complaints about the work of the traditional post office. There are long lines of people in front of the bill payment windows, letters arrive late and so forth. When will this situation improve?

[Answer] I have already briefly characterized this branch of the service when I said that its work is adequate by international standards but we are fighting some problems. The opinion of the postal service management of these problems is that they must be given attention, even though in comparison to the service as a whole number of complaints amounts to only a small fraction. That is, the person whose telegram arrives slowly or who receives his morning newspaper in the afternoon, has a legitimate complaint. Of the 35,000 postal workers in the area of the traditional postal service, the decisive majority do honest work. But there are also a few among them who, with their behavior, with their attitudes of playing up an air of authority, cause much damage to the postal service as well as to the population.

Beyond the human factors we could list many other problems of this service. It is the nature of the work that it is difficult to automate; also no small portion of the over 3,200 post offices are old, obsolete and hardly suitable to serve the public. We are quite familiar with the problems that occupy the public opinion, and the postal service management--having developed an order of importance--is attempting to solve them in sequence. By the middle of the decade we will have spent 2.6 billion forints to improve this service; this year alone, we are building 80 new post offices and modernizing an additional 250. We are establishing new central processing facilities, which will speed the delivery of mail. We are buying many small machines. These will make our work easier and at the same time will also reduce the need to stand in lines. Due to the character of our service, we attribute very great significance to courtesy; lately we have been preparing our employees for this in special courses.

[Question] What other plans are there?

[Answer] We absolutely consider continuous improvement of the postal service's work to be our job. Therefore we want primarily to improve our existing services. But at the same time we seek new opportunities that better fit today's demands. We first of all, need to leave behind the old, usual frameworks and formats, because the postal service needs to have a business policy, too. Thus we would like to increase the scope of the traditional postal services. For example, we are planning that if there is no pharmacy in a village, the prescription could be left at the post office, and next day a person could pick up the medicine. We are conducting discussions with the appropriate

authorities, so that if only a branch council is operating somewhere, we could combine it with the work of the postal service; by doing this the expenses would be shared, and manpower shortage would also be eased. It is also in our plans that the mail as well as wages be delivered to the large users. The postal service in Hungary handles many types of cash payments: For example, a lone mailman walking on the street often carries hundreds of thousands of forints in cash, delivering social security payments, retirement pay to retired state employees (and in Hungary almost everyone works or worked for the state; I was present, for example, when my late father's friend, a retired veterinarian received his 8,000-some forints of monthly retirement pay; the mailman just rang the doorbell, handed over the cash, asked for his signature, and that was it. On his route he may have handled a hundred of these in a day, though this one was probably the largest single monthly payment made in the whole city), railroad retirement pay, etc.--all in cash, no checks. In the early 1950's when Hungary needed cash, the postal saving association helped it out, as it also runs a savings plan for the general population, not just for its employees. And one of our people would be present on paydays; he would handle all types of payment obligations. These types of things could also contribute to developing a better image of the postal service.

With Less Administration...

[Question] We have heard about many depressing problems and big plans. In the final analysis will there be a well-functioning Hungarian postal service?

[Answer] I am an optimist. After several years of modest wage improvements, last year we were able to raise the pay of postal workers by 8.6 percent. This, of course, has also made it possible to expect more from them. And it is also no small thing that we have succeeded in allowing 47,000 postal workers to take their weekly days off on Saturday and Sunday. And we have been able to create truly favorable wages for those approximately 18,000 workers who work on Saturdays and the 16,000 who work on Sundays.

In addition to their daily jobs, more than a thousand postal workers--together with many outside experts--are working on modernizing all of the postal service's services, and with less administration. We want to work in better, fresher spirits than before.

Many things have happened in the postal service even in recent years. For example, we have introduced the guide numbers [zip code] and started the first automatic letter-sorter; we have changed over to long-distance dialing and installed machines to sell postcards and stamps. All these are changes for which we had to ask the population repeatedly for its understanding and support; without this, these modernizations, which are in the public's interest, could not have taken place.

If we try to implement self-financing, the rates will increase temporarily and thus volume may decline. We must--with an appropriate business policy--counterbalance this well in advance; that is, [we must] further improve our services and in addition to them we must also take on new ones. We know that

10 percent of the mail does not arrive at its destination by the deadline that we have placed on ourselves. We wish to decrease this to 5 percent by the end of the plan period, and even lower after that. We have many other plans. Among others, we want to place additional automatic letter-sorter equipment into operation in Szolnok and in Szekesfehervar. The postal-processing facility that will be completed in 1985 will much improve the distribution of newspapers. That is, the conditions of this--including transportation and sorting--for the time being fall short of those of the other postal work and provide the reason for many complaints by subscribers.

It will be decided soon--and this depends largely on us--whether we succeed in creating a new, modern postal service, one of the services of which will, under the present conditions, elevate to higher standards this largest-volume daily service and restore the good name of the postal service.

8584

CSO: 5500/3008

BRIEFS

ZBM TAKEOVER OF ZFB--ZBM is to take over the financially ailing ZFB for just under \$1/2 million. Some jobs are likely to be lost in the takeover which will lead to the combined operation being based at ZBM's Prospect studios. But executives of both companies stressed last night that ZBM and ZFB will remain separate stations and that the deal will provide more varied programmes for Bermudian viewers. The takeover was announced at a press conference arranged jointly by the Bermuda Broadcasting Company, operators of ZBM television and radio, and the Capital Broadcasting Company, operators of ZFB. [Excerpt] [Hamilton THE ROYAL GAZETTE in English 18 Mar 82 pp 1, 6]

RADIO SATELLITE LINK--Radio VSB plans to link up with a top U.S. network if it gets approval to operate a second FM station in Bermuda. VSB's management yesterday announced that it had applied for a licence, and that if the go-ahead was given, the station would bring in live top radio programmes in stereo by satellite. These will complement the company's planned AM-FM "simulcast" programming. "Simulcast" is the simultaneous broadcasting of a programme over more than one radio station. VSB already has a licence to operate one FM station, which will start broadcasting in stereo as soon as the necessary equipment arrives. This latest station will, if approved, use material from a prominent U.S. network. Negotiations are going on now to secure the rights to some leading programmes. News bulletins will go out on all three stations. VSB has already applied for a fourth station--another AM channel--which Government will consider later. [Hamilton THE ROYAL GAZETTE in English 19 Mar 82 p 2]

CSO: 5500/7527

BRIEFS

NEW RADIO STATION--The Cohen group recently announced the establishment of a new radio station in Chitre, identified as Radio Ritmo. Manuel Cohen S. will be general manager of this new station, which is related to Radio Titania operating in Panama City. Radio Ritmo will cover the central provinces with a power of 5,000 watts on a frequency of 1070 kilohertz. Titania is heard with a strong signal of 1380 kilohertz. Cohen said that the two stations will have popular music programs, news and timely coverage of sports events here and abroad. [Panama City CRITICA in Spanish 6 Apr 82 p 5 PA]

CSO: 5500/2197

TELCO STRESSES MODERNIZATION IN ANSWERING UNION CHARGES

Port-of-Spain TRINIDAD GUARDIAN in English 25 Mar 82 p 10

[Text]

WITHIN the next five years, the Trinidad and Tobago Telephone Company will be in the enviable position of having some of the most modern equipment of any telephone company. This was stated by Dr. Neil Mackay, Telco's Executive Director, in reply to charges by the Communication Workers' Union that obsolescence was one of the reasons preventing the company from performing efficiently.

The Union gave its view of constraints on Telco during a recent meeting with the Public Utilities Commission (PUC) under the chairmanship of Dr. Selwyn Ryan. The CWU, under Mr. Lyle Townsend, gave a number of reasons, one of them being obsolescence. The Union stated:

Over the years there was no upgrading of technology by the Telephone Company. The rapid development and increasing demands of the country outstripped the capacity of the Company to perform efficiently.

New equipment has since been bought from Japan, but the Union is of the opinion that the ND 20 Exchanges are already obsolete. They do not have all the modern accessories nor the same switches that are used in the country of their origin.

It was asserted that it was not merely a question of the tandem switch being too small. The exchange itself is too small and too slow. The equipment is the wrong one for our con-

text and has never passed any acceptance test.

The CWU is of the view that the ND 20 will never work effectively. As it is now, load has to be shed in certain areas at least 3 times per week.

SMOKE ALARMS

The CWU also indicated that all the new Exchanges are supposed to have been equipped with smoke alarms to give early warning of fire. TELCO has however not installed a single alarm in any of its exchanges. In the Nelson Exchange fire last year, even the fuse was not blown.

It was also observed that in Japan, which CWU officials toured, pressurised cables are used. Telco however uses grease-filled cables. The technicians of the Union claim that these are unsuitable. The grease melts in the heat and interferes with the connections. The grease further softens the joints.

In some areas, when the tide is high, water gets into the manholes and affect the

cables because the grease has melted. In other areas, ants get into the cables.

All of this interferes with transmission. It was also noted that transmission via aerial cables is less than perfect. Aerial cables have little tolerance and adaptability and are affected by their proximity to electricity wires.

In reply to the Union's view, Dr. Mackay stated:

The discussion on obsolescence apparently covered several issues that are, in fact, not related to obsolescence in anyway.

If I may interpret the Union's contention as being directed to the exchange equipment, the network is equipped with several step by step exchanges, one cross bar exchange and now a series of stored programme exchanges being installed by Nippon Electric Corporation.

The step by step equipment is indeed quite old, some pieces running to approximately thirty years of age.

The cross bar equipment is approximately fifteen years old, and the ND-20 equipment has been in

operation for only a few years.

It is true to say that both step and cross bar equipment are no longer manufactured in developed countries, stored programme equipment, however is still being manufactured.

It is worth noting, however, that the reliability of both step equipment and cross bar equipment is such that well over 75% of all exchanges in operation in developed countries is still of that generation.

Consequently, a distinction between old equipment and obsolete equipment is worth noting. If one were to compare the percentage of lines that will be served by stored programme equipment and by step equipment by the end of 1982, it is also true to say that the Company will have a much smaller proportion of step equipment of any company in the developed world.

The problem, therefore, is not necessarily one of obsolescence but more of the Company's capability to maintain its equipment; without maintenance, equipment rapidly becomes obsolete by virtue of the fact that it can no longer function.

It is interesting to note, however, that the Company has made a decision to purchase only digital exchanges, the most modern technology, and will therefore find itself in the enviable position of having some of the most modern equipment of any telephone company within the next five years.

Coupled with this decision, must be the resolve to properly maintain the equipment in the future and to train its personnel to manage a more sophisticated network.

With regard to the ND-20 exchanges in particular, the exchanges are quite suitable for cities of medium density. For large cities, as in Port of Spain and San Fernando, a system with higher capacity is required.

It is worth remembering that the ITT North equipment was purchased by the Company to provide these very functions for Port of Spain, San Fernando and San Juan.

However, when it became apparent that the ITT North equipment would be late (and now will not be supplied at all) the Company purchased further ND-20 equipment for the three cities to provide a rapid but interim solution.

BRIEFS

GBC EXTERNAL SERVICE RESUMPTION--The External Service of Radio Ghana has resumed after nearly four years because of a breakdown of transmitters at Tema and Ejura. However, the service is now in only three languages--English, French and Hausa--as compared with the earlier broadcasts in six languages when the service was launched by Kwame Nkrumah in June 1961. Arabic, Swahili and Portuguese have now been dropped. The new president of the Union of National Radio and Television organisations of Africa (URTNA) is Mr. Abderahmane Laghouati, Director General of the Algeria Radio and Television. He succeeds Mr. Owusu Prempeh, Ghana's Director of Sound Broadcasting, whose two-year term of office was rounded off with the URTNA General Assembly held in Dakar, Senegal, recently. The Ghana Broadcasting Corporation (GBC) has been re-elected to serve on the Administrative Council of URTNA for another two-year term. The GBC was also elected as the chairman of the 15-member Legal and Administrative Commission of the Union with Togo as vice-chairman. The GBC is among six member organisation of URTNA to benefit from a pilot television programme exchange project being undertaken by the Union in co-operation with the GTZ foundation of West Germany. The protocol agreement for the actual implementation of the project has been signed between the governments of Kenya and the Federal Republic of Germany. The GBC is at present exchanging programmes on a bilateral basis with the Voice of Kenya. URTNA's Programme Exchange Centre is based in Nairobi, Kenya. [Excerpt] [London WEST AFRICA in English No 3373, 29 Mar 82 p 898]

CSO: 5500/5750

SHORTWAVE STATION INAUGURATED; DUTCH AID PRAISED

Details of Ceremony

Tananarive MADAGASCAR-MATIN in French 11 Feb 82 pp 1, 2

[Text] Late yesterday morning, Bruno Rakotomavo, minister of information, ideological orientation, and cooperativization, inaugurated the Sabotsy-Namehana short-wave broadcasting center. We noted the following information in his speech:

--New shortwave relay transmitters of Radio Netherlands Wereldomroep will soon be installed at Betroka, Farafangana, Antsohihy, and Sambava.

--Test broadcasts in FM stereo are underway.

--We are counting on assistance from Radio Netherlands in expanding our television service.

--Discussions on establishing Radio University for training in radio are in progress.

--The Sabotsy-Namehana relay center: 110 million [Malagasy francs]; 100 kw short-wave transmitter (145 million).

A summary of the minister's speech follows:

Fruitful Cooperation

I am happy to note the continuation of the fruitful cooperation between the Malagasy Government and Radio Netherlands Wereldomroep since the signing on 31 October 1967 of the technical and economic cooperation agreement.

Before getting to the purpose of this ceremony, I want to review the main phases of this outstanding cooperation.

It is thanks to equipment supplied since 1972, as a gift, by Radio Netherlands that we have been able to install mediumwave centers in the faritany and in some fivondronana with human and economic potential for the future.

Beginning in 1975, Radio Netherlands strengthened its cooperation by giving 250-watt mediumwave transmitters to the following towns: Antsirabe, Maintirano, Antalaha, and Nosy-Be. This year, four more fivondronana--Betroka, Farafangana, Antsohihy, and Sambava--will receive mediumwave relay transmitters from Radio Netherlands, after completion of civil engineering work under the responsibility of the Department of Information. This will bring to 16 the total number of mediumwave relay centers.

In May 1980, Radio Netherlands installed an FM monophonic station, and tests of FM stereo are now being conducted jointly by the radio and the ministry's technical infrastructure staff.

Shortwave Center for 145 Million [Malagasy Francs]

The station which we are about to inaugurate is the result of the turning over by Radio Netherlands in May 1979 of the land and building of the Sabotsy-Namehana relay center, worth an estimated 110 million Malagasy francs, and the installation of a 100-kw shortwave transmitter as well as furnishings and spare parts worth 145 million. Radio Netherlands also guaranteed a power supply to the transmitter for 5 years.

This great achievement again underlined the open policy of Madagascar, which accepts the assistance of friendly countries on terms of mutual benefit and respect for national sovereignty.

Voice of the Revolution in the Smallest Fokontany

The tests now being completed show that this high-power transmitter will reach the smallest fokontany. The voice of the Malagasy Socialist Revolution will thus reach clearly and plainly the productive forces--farmers and stockraisers--at a time when the development struggle is at its peak throughout the country.

Everyone recognizes the importance of radio in promoting awareness and in training and educating the working masses, the literate as well as the illiterate.

With this means of mass communication, which we will use wisely, we hope to overcome the reticence of those who are nostalgic about the past and to lead the rising generation to a more and more acute awareness regarding the present and future of all men in an industrious and peace-loving community.

For Continued Cooperation

Mr Ambassador, Mr Chairman and Managing Director of Radio Netherlands, the revolutionary government is grateful to you for your gifts and the many kinds of assistance you have given us in developing our mass media. We also count on your selfless cooperation in expanding our television, the indispensable and effective complement of radio broadcasting in illustrating the results of irresponsibility and arousing the creative spirit of an industrious people.

In conclusion, I express the hope that this exemplary cooperation between Radio Netherlands and Madagascar will continue even stronger in the coming years, and

that with your help the Malagasy people will before long be able to dispense with your aid, this being the rational objective of any assistance program.

I thank you.

There were speeches by representatives of the decentralized host communities, i.e., the vice president of the Antananarivo-Avaradrano Fivondronana and the chairman of executive committee of Antananarivo Faritany, and then by the representatives of the donor country: the Netherlands ambassador to Madagascar, and Mr Acda, chairman and general manager of Radio Netherlands.

Rejection of Monopoly of Information

Vice President d'Avaradrano said, in substance, that this location is privileged to serve as the center of Netherlands-Malagasy cooperation. Even if the ideology is not the same, we will be worthy of these gifts....

The chairman of the faritany executive council stressed the importance of the ambassador's presence at the ceremony, because the Malagasy people believe in international cooperation and are certain that this cooperation will bring us many advantages.

The ambassador of the Netherlands related the event to the new international information setup: He said the Netherlands has rejected the monopoly of information by a few, and on this the positions of Madagascar and the Netherlands coincide.

He also took the occasion to express his sympathy regarding the current flood situation, which he said "had touched their hearts." He then hoped the station will play its role for many years to come.

Mr Acda noted the happy circumstances which have resulted from Madagascar-Netherlands cooperation; there is esteem and an atmosphere of cordiality which is like a family gathering. He praised Madagascar, referring to "its magic, seductive power."

He said he believes mass communications are the leaven of unity, the free forum of friendship.

The ribbon-cutting, a tour of the center, and the release of colorful balloons concluded the inauguration ceremony.

Minister of Information's Speech

Tananarive MADAGASCAR-MATIN in French 12 Feb 82 p 2

[Text] The Sabotsy-Namehana station was previously a Radio Netherlands receiving station. Since 1970 it had recorded and assembled programs here and sent them to Talatanivolonondry.

In 1979, Radio Netherlands improved the station and installed a 100-kw shortwave transmitter.

The infrastructure cost 110 million Malagasy francs; the equipment plus the spare parts to keep it in operation [cost] 145 million. It was all turned over to Malagasy Radio-Television.

With regard to the Talatanivolonondry station, there is a 20-year agreement. The Talata station broadcasts Radio Netherlands to Africa and Asia.

This situation is of considerable value to Malagasy Radio-Television and opens up technical possibilities. The importance of these was stressed in the speech at the inauguration by Bruno Rakotomavo, minister of information, ideological orientation, and cooperativization. The following are liberal excerpts in a free translation in French:

Today is certainly a great day, because the Revolutionary Power has advanced into a new phase of radio broadcasting.

Two points can be made about radio:

1--Given that all three transmitters are of the same power, shortwave has the longest range, mediumwave next, and finally FM. The people who work with them are not well known; they operate from "behind the window" on maintenance. We give them special congratulations.

2--There are also the announcers and program planners; they are familiar to most of the listeners and can be directly appreciated for their voices, their manner of speaking, and the content of what they say.

Status Report

Reviewing the technical progress with the transmitters, we can report as follows:

1--In all of Madagascar there are now 15 mediumwave transmitters, of which 2 are at Fenoarivo, 4 kw each; another of 150 kw at Imerintsiaosika; and 1 kw each at Toamasina, Mahajanga, Toliara, Tolagnaro, and Fianarantsoa.

At each of the following locations there is a 250-kw transmitter: Maintirano, Antsirabe, Morondava, Nosy-Be, Ambatondrazaka, and Antalaha. Only the 150-kw transmitter at Imerintsiaosika can reach all of Madagascar after dark. The others can only reach the area around the town.

2--There are five shortwave transmitters in Antananarivo Faritany: four at Fenoarivo, 4 kw, 30 kw, and 100 kw; and the fifth at Sabotsy-Namehana.

For the present, there are only two shortwave transmitters, at Fenoarivo and Sabotsy-Namehana, which cover all of Madagascar well.

Resuming his review, the minister cited the improvement in the audibility of the national radio since 1975, during which period the major landmark has been the

installation of the 150-kw mediumwave transmitters at Imerintsiasika and Sabotsy-Namehana.

The Netherlands Government gave us six 1-kw mediumwave and five 250-kw mediumwave transmitters as well as two 250-watt FM transmitters, one mono and the other stereo. The latter is currently in its test period and can now be heard at Antananarivo at nightfall.

Still Other Transmitters

Looking to the future, the Netherlands Government will also supply four mediumwave transmitters for Betroka, Farafangana, Antsohihy, and Sambava.

Mr Rakotomavo thanked all those who had made this achievement possible: the Malagasy technicians; the representative of the Netherlands Government, Ambassador Van der Willigen; and the head of the Radio Netherlands local station, Mr J. Van Wijngaarden. In the course of the inauguration ceremony, the latter was promoted to the rank of Chevalier of the Malagasy National Order.

Why Have Radio?

The minister of information, ideological orientation, and cooperativization went on to explain the value of radio, giving five functions:

First, we know that for a developing country like ours, radio is an important tool of communication between the people and the leaders, and also among the people themselves. It is also an important means of communication for cultural stimulation, information, and entertainment. Thus, said Bruno Rakotomavo, one should listen to the radio.

Communication Between People and Leaders

A great deal of guidance is broadcast over the radio. President Didier Ratsiraka's numerous speeches constantly contain guidance which affects the entire nation. Obviously, if we depended only on the printed word to disseminate guidance to all the fonkontany, it would probably not reach everyone for months. In any area where a kabary is issued, it can be broadcast and reach all Malagasy people by the medium of radio. Thus it is not necessary each time to tour each faritany and repeat it. Often there are decrees that are to be implemented as soon as they are broadcast. On the other hand, there frequently are reports coming from the people for the leaders, reporting on achievements, or there may be problems that require a response. Clearly there would not be communication between the leaders and the people if both groups did not listen to the radio. That is why we must listen to the radio, Minister Bruno Rakotomavo reiterated.

Communication Among the People Themselves

The minister continued: There is another aspect that I would like to emphasize. The fact that a region learns about the achievements, efforts, and solutions of another region encourages each one to emulate the other and to do better than it has heard about on the radio.

Just being mentioned on the radio is an encouragement, because the regions know from hearing the radio that they are no longer working alone.

Cultural

Radio is a means of education and changing ways of thinking which does not involve diplomas. Obviously it requires personnel who are expert and skilled in speaking. I hereby appeal to all departments and experts of all kinds: The national radio is prepared to include in its programs statements about achievements or projects involving the transfer of technology to the people.

The revolution has accomplished a great deal, but often we fail to publicize it. Radio is one means of communication for making these achievements known.

Finally, with respect to reading versus listening to the radio, much more effort is needed. We can listen to the radio day or night, and everyone should benefit by doing so.

Information

Every day there are hundreds of news items to broadcast, both local and foreign. With regard to news about Madagascar, it is a matter of selecting material which concerns the national life, and also of distinguishing between news of particular significance which is appropriate to broadcast to the people, and news which concerns only one area, its local activities.

With regard to foreign news, here also there is a large volume in a day, and selection is required: only the more important items and those relating to our foreign policy and our nonalignment.

Listening to world news broadcasts, we observe that the comment of each source reflects its ideology, and there is nothing wrong with Malagasy journalists' having opted for socialism.

Entertainment Is Important to Life

...And the national radio plays its part. Each person has his own preferred type of entertainment, but we present what pleases the largest number.

With regard to projects, he concluded, our objective is to have one mediumwave center per fivondronana administrative center. We can now envisage tailored programs for each fivondronana, in addition to programs for the nation as a whole.

Achievement of all this involves not only equipment but also personnel, and the latter require training. We are thus happy to announce that studies about the beginnings of radio are in progress on completion of the training.

Long live Netherlands-Malagasy cooperation.

Long live Madagascar, which does not kneel down.

9920

CSO: 5500/5713

EXPERT DISCUSSES OUTLOOK FOR COMING TELECOMMUNICATIONS ERA

Copenhagen BERLINGSKE TIDENDE in Danish 29 Mar 82 Sec III p 5

[Article by Poul Moller]

[Text] The total expansion of the communications network over the next 10 years will cost 26 billion kroner.

Denmark is headed for a technological development some experts describe as revolutionary. The most advanced technology will become available and it sets almost no limits on imaginative visions of the future. The expression "brave new telecommunications world" has been used and since the technical means are not an end in themselves but merely tools, it is up to us to decide whether they will be used wisely.

Mogens Bomann, general secretary of the Danmedia Study Group, founded in 1979 by public and private communications firms, is an optimist. At a recent public hearing attended by other experts and the Folketing committee on scientific research, he said among other things:

"Information technology is the rational and systematic use of information to solve a nation's economic, social and political problems." In a nutshell, Mogens Bomann says that the advantages of the advanced information technology are that it gives citizens rapid and easy access to all the data and information available. At the same time he sees a chance for more jobs in a number of fields, including industries oriented toward export.

Just as concisely, he says of the disadvantages that in the past ordinary people have lacked information about and training in the possibilities and limitations of the new technology and that therefore they have reacted with doubt and fear to the new problems in society.

Broad-Band Network to All Households in 1990

The central point in the new technology is a future nationwide two-way broadband network, in other words a single communication channel covering telephone, teledata, radio and TV and having basically the same possibilities for two-way contact as the present telephone network. The communications

network's capacity is being increased to fantastic levels even now with the introduction of fiber-optic cables (hair-thin threads instead of the old copper wires, making it possible to make thousands more connections per line). In order to cover all of Denmark, in other words to establish connections with every single household, around 80,000 km of ditches for cables must be dug and Danmedia estimates this would employ 5000 people for 10 years. Total construction in the decade from 1980 to 1990 would cost 26 billion kroner (in 1980 prices).

"At the public hearing I countered the fears expressed that great unemployment would follow in the wake of the new technology," said Mogens Bomann.

"In addition to the labor needed for construction over a 10-year period, I would think the information sector in the broad sense--the daily press and the entire graphics branch, advertising, education, radio and TV--would have an annual growth of 10-15 percent. We are trying to find figures on how many people are actually employed in this sector in Denmark today but this requires a fine breakdown of the statistics. In the United States, from 40 to 50 percent of the labor force works in this sector. An increase of 10-15 percent a year in Denmark might mean several thousand, but I confess this is a shot in the blue. But many more technical workers will be needed too. Today, Danish businesses are already short 2000 computer operators, but there are all too few teachers in this field."

No Fear of Passive Telematics Recipients

"Then we come to our export possibilities. We can hardly build large technological robots in Denmark--this is being done in other countries--but it should be stressed that we are close to being world leaders in programming (the so-called software construction of control systems and simulation models and so forth). Denmark has an education level with a highly intellectual labor force."

Mogens Bomann acknowledges, as so many do, that there can be ethical and social problems concerning information technology, including human alienation, but he rejects the theory of the passive telematics recipient hooked to the screen.

"In Tokyo there are eight TV stations broadcasting 24 hours a day. Intensive Japanese studies have shown that a Japanese family watches an average of 3 hours and 29 minutes of TV a day and cultural life and family fellowship are thriving in Japan. Newspapers are still printed in editions in the millions. And what about us in Denmark? In 1979 a study made by Danish Radio showed that each viewer watched an average of 9 hours of TV a week--compared to 13 hours 3 years before. The individual's stock of knowledge increases with easier access to information. Listen to what the libraries have to say about the massive borrowing of books on animals following TV shows dealing with animal topics."

Creativity Instead of Routine Work

"I do not think an already existing gap in society between those who understand the new medium and use it and those who do not will be widened. The level of knowledge of the entire population will be raised and the almost 20 percent of the people who do not go to the library due to a certain kind of fear--though these are mostly older people who have a feeling of inferiority--will now have a chance. Without any special knowledge, the individual will be able to push a few buttons and obtain data he or she would like to have. In the future everyone can get training, in-service training and advance knowledge of activities. The new information technology can replace a lot of routine work and provide more time--in hospitals, in the production branch, in the home--for meaningful work, human contacts and personal creativity. The 30-hour work week will become a reality when--or if--the new telematics is introduced in its entirety by 1990.

"And what is wrong with having so many choices with regard to TV, for example? Why shouldn't the individual have a big selection here just as we have in the case of newspapers? This means we would not have a kind of universal Danish Newspaper--not if we have a brave new world in the true sense of the phrase."

Also Anxiety About the New Telematics World

There are many angles from which one can look at our new technological era, including information technology or telematics with its unlimited forms of development. As we saw at a recent public hearing at Christiansborg, a group of experts was almost equally divided into positive and negative attitudes, concentrated on the consequences of the technology as well.

No one denies that the new technology, for instance in the form of monitor screens that are increasingly being used in hospitals, nursing homes and households where there is an elderly person, can be extremely beneficial. One can also see the immediate usefulness of technology in the form of having robots perform tasks that free people for other things.

Some people express fears of increased unemployment, due in part to jobs becoming directly redundant and in part to the problems some people on the job, and not just older people but others as well, have and always will have in grasping technology. Well, but now employers will also have even more precise and direct control over job performance, it has been charged. An uncomfortable thought, according to many. And on the subject of jobs, a woman researcher expressed the opinion that information technology/telematics will make it possible to perform a job at home--remaining in constant contact with the job site's central terminal via the broad-band apparatus--and this would mean that women primarily could sit and work at the screen terminal with one hand while running the household with the other, as she put it. Discrimination with a vengeance, was the implication. The woman with a routine part-time job at home, the man working at a more creative

full-time job outside. People also indicated the dangers of dividing the population into haves and have-nots with regard to information. Fears were also expressed of isolation in the home--during working hours as well as during free time--without human contacts, without actively seeking more creative possibilities.

If one really wants to conjure up a scary picture of the "brave new telecommunications world" concept, one can, as several people have, present the phantom of "Big Brother" keeping an eye on all of us from his state throne room, equipped with computer terminals.

6578

CSO: 5500/2179

MULTISERVICE CUSTOMER ACCESS, DATA COMMUNICATION HANDLING IN FUTURE ISDN'S

Rome NOTE, RECENSIONI, NOTIZIE in English Oct-Dec 81 pp 147-157

[Text] MULTISERVICE CUSTOMER ACCESS AND DATA COMMUNICATION HANDLING IN
FUTURE ISDN'S (*)

R. Montemurro (**), F. Villani (**)

Summary:

In this paper the main features of ISDN customer access and local exchange functional architectures allowing to operate a set of new emerging communication services are examined. Network signalling procedures to access dedicated and integrated packet switching facilities are also briefly considered.

1. INTRODUCTION

The Integrated Services Digital Network (ISDN) is now emerging from the international debate as the new telecommunication target of EC's and European PTT Administration are attempting to define its structure and facilities. Of course, various factors influence national starting conditions and evolution strategies (state and age of existing networks, present degree of digital penetration, investments, national services policy, etc.) so that, time scale, successive steps and also final assessments of future national ISDN's can significantly vary in different countries.

To cope with this situation, international standardization bodies (and mainly CCITT and CEPT) are trying to identify and achieve at least some minimum commonality requirements and

basic common features for the ISDN's. In this context, a key role is played by the work being carried out within CEPT on ISDN customer access, considering the customer capability to exploit present and new telecommunications services by suitably using transmission, switching and processing resources of the integrated network.

The aim of this paper is twofold: on one hand it tries to restate most recent technical options on customer access as they are emerging from CEPT and CCITT discussions while on the other, taking into account Italian views and some international trends on the matter, it examines and briefly discusses some possible aspects of data communication handling in the ISDN's.

Sec. 2 deals with some over-all ISDN reference features as they are envisaged in Italy and Sec. 3 examines some new emerging telecommunication services. Sec. 4 is devoted to a short discussion of various possible ISDN multiservice customer accesses; in Sec. 5

(*) presentato a "26° Giornate Europee delle Telecomunicazioni"
Lussemburgo, 31 agosto - 4 settembre 1981

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present options on the multiservice basic access are examined and reviewed, while some considerations about ISDN operation for data services handling are presented in Sec. 6. Finally, a possible alternative type of multiservice customer access suitable for short-term implementation is discussed in Sec. 7.

ISDN REFERENCE MODEL

Considering possible characteristics of the future ISDN, one should be aware of the following main factors:

Today early developing Circuit Switched (CS) and Packet Switched (PS) public data networks are likely to expand further in the near future and to operate at least for some more years.

Network-provided services, handled by network Information Processing Facilities (IPF) are now emerging in view of new foreseeable customer capabilities.

The telephone network is expected to be able to offer, within 5-10 years, nationwide CS connections at 64kb/s suitable for both telephony and data.

It is now widely recognized that this future Integrated Digital Network (IDN), arising essentially in local areas, will be the backbone of the emerging ISDN, which would likely result from the progressive introduction of the use of a wide range of new established and emerging facilities. In this context, various ISDN architectures can be conceived; in addition, a new feature consisting in providing connections with 64kb/s digital connectivity, and with different ways of integrating CSF, PSF and IPF in the network can be conceived, leading to various functional and integration environments characterizing ISDN architectures.

The one shown in fig. 1 and reflecting the ITU-T [1] [2] [3] view, is considered general enough to cover most ISDN features [1,2]. This (figure 1) [4] [5] [6] [7] [8] [9] [10] [11] [12] [13] [14] [15] [16] [17] [18] [19] [20] [21] [22] [23] [24] [25] [26] [27] [28] [29] [30] [31] [32] [33] [34] [35] [36] [37] [38] [39] [40] [41] [42] [43] [44] [45] [46] [47] [48] [49] [50] [51] [52] [53] [54] [55] [56] [57] [58] [59] [60] [61] [62] [63] [64] [65] [66] [67] [68] [69] [70] [71] [72] [73] [74] [75] [76] [77] [78] [79] [80] [81] [82] [83] [84] [85] [86] [87] [88] [89] [90] [91] [92] [93] [94] [95] [96] [97] [98] [99] [100] [101] [102] [103] [104] [105] [106] [107] [108] [109] [110] [111] [112] [113] [114] [115] [116] [117] [118] [119] [120] [121] [122] [123] [124] [125] [126] [127] [128] [129] [130] [131] [132] [133] [134] [135] [136] [137] [138] [139] [140] [141] [142] [143] [144] [145] [146] [147] [148] [149] [150] [151] [152] [153] [154] [155] [156] [157] [158] [159] [160] [161] [162] [163] [164] [165] [166] [167] [168] [169] [170] [171] [172] [173] [174] [175] [176] [177] [178] [179] [180] [181] [182] [183] [184] 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The architecture CSF implemented by the PCM network, providing physical 64kb/s (independently of the rate between addressed or permanently connected end-points (Telephone Terminal Equipments - TTE's -, Data Terminal Equipments - DTE's -, ports to IPF or IPF, gateways to dedicated networks, etc.).

1.1 PSF and IPF embedded in the CSF.

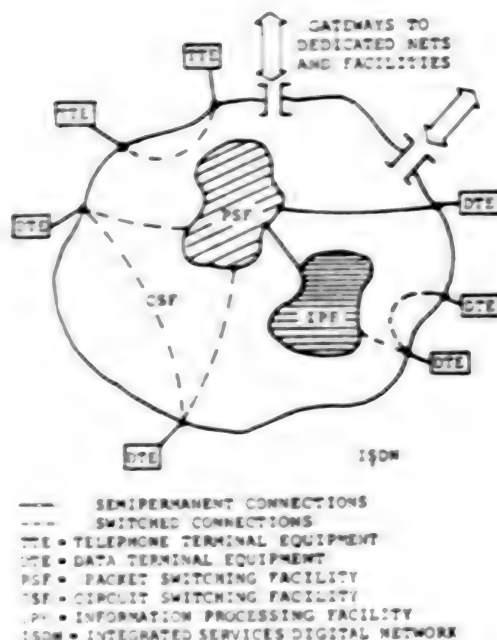


Fig. 1 - Logical ISDN Model.

A possible resulting functional network structure is shown in fig. 2, including also, as an example of possible ISDN customers, analog subscribers, digital subscribers and digital PARK's. In this model CS data and telephony services are conceived to be fully handled by the PCM local and transit exchanges connected by PCM links and operated in a synchronous mode. Interexchange Common Channel Signalling (ICCS) facilities are widely used to interconnect the Signal Points (SP's) corresponding to PCM exchanges by means of an appropriate ICCS network comprising Signal Transfer Points (STP's). It is also assumed that ICCS conforms to the CCITT No. 7 standard suitable for both telephony and CS data communication. Hence, PCM exchanges will be able to switch 64kb/s channels regardless their voice or data content. In the architecture shown in fig. 2, it is also recognized that PS data should be treated by ad-hoc Packet Switching Units (PSU's) located at convenient network nodes and accessed via PCM facilities. These PSU's are connected via permanent or semipermanent 64kb/s channels to other PS facilities within the ISDN or also to dedicated PS networks.

This architecture refers to a medium-term evolution and in this paper will be considered as the basic ISDN model. The following significant points will be discussed and clarified:

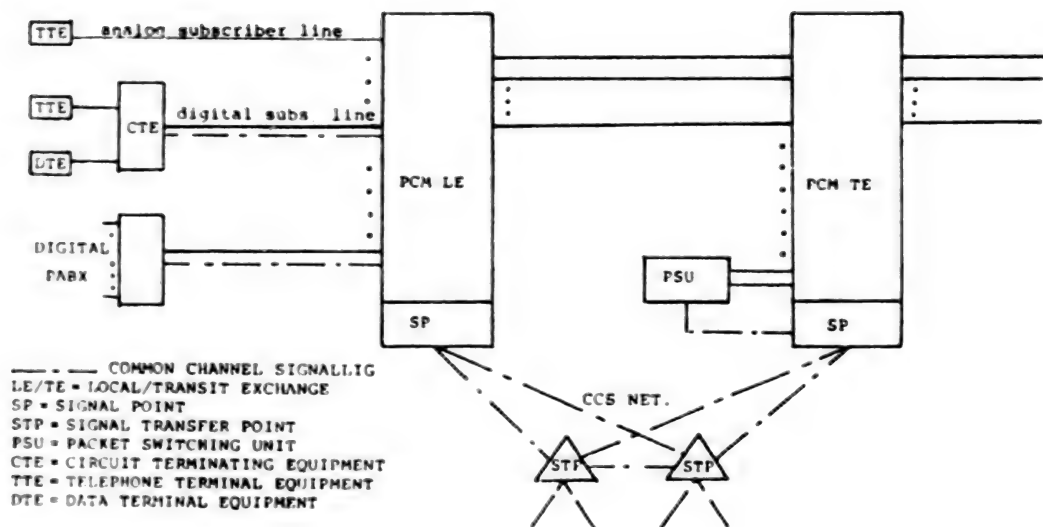


Fig. 2 - Functional ISDN Structure.

Tab. 1 - New Emerging Communication Services.

- i) customer features and capabilities for multiservice digital access such as information types, transmission channels and functional interfaces (Sec. 5);
- ii) network operation features for CS and PS data communication considering both present digital switching technology and possible future multimicroprocessor PCM exchanges implementation including also packet switching functions (Sec. 6);
- iii) possible features of an intermediate alternative solution for multiservice customer access exploiting as much as possible the existing loop plant (Sec. 7).

3. COMMUNICATION SERVICES AND CUSTOMER CAPABILITIES

In addition to the present analog telephone service which is likely to be retained for very long time also in a digital environment, a set of new communication services for texts, graphics and data is now emerging for both home and business applications. A possible rough classification of such services is shown in Tab. 1, where they are listed according to their expected information throughput.

The first group, labelled as "telemetry", refers to very low bit rate data transmission mainly for home services with low activity rate and burst mode of operation (in form of short aperiodic digital messages), but also for

10³ - METER READING - SECURITY/ALARMS - OPINION POLLING - TELECONTROL (E.G. ENERGY MANAGEMENT) TELEMETRY 10¹	10³ - LOW BIT RATE VOICE - HIGH SPEED SWIT. DATA - PCM TELEPHONY - FACSIMILE - SLOW-SCAN VIDEO
1 - VIDEOTEX - TELETEX - HOME COMPUTER - HIGH SPEED VIDEOTEX - HOME FACSIMILE - LOW SPEED SWIT. DATA CAPACITY (KB/S)	10² - HIGH SPEED FACSIMILE - VIDEO TELEPHONY (?) - WIDE-BAND MUSIC
	10¹ - VIDEO TELEPHONY - INTERACTIVE VIDEO RETRIEVAL - VIDEO CONFERENCE CAPACITY (KB/S)

business services (telecontrols) with a higher activity rate. Although not yet defined, these services are expected to be suitably handled in some PS mode of operation: datagram for bursty traffic and permanent virtual call for bulk traffic.

The second group refers to home and business services for texts, graphics and data communications up to about 10kb/s. Transmission could be synchronous, either CS or PS. The high-speed Videotex (≈ 8 kb/s) will allow a fast service (one page per second) while the home facsimile refers to CCITT Group 3 and 4 terminals standard.

In the third group, besides the 64kb/s PCM telephony, some form of new low bit rate (e.g. 16kb/s) voice information has been considered,

taking into account expected technology advances that will allow economical VLSI implementation of sophisticated digital voice coding.

All these services are compatible with the present standard for digital telephony (64kb/s),

while the remaining broader band services will require either multi-slot PCM connections (e.g. up to 4 time-slots as in the case of a possible videotelephony service), or dedicated transmission and switching facilities (e.g. at 2.048 or 8.448 kb/s).

To achieve an effective exploitation of such communication services at customer premises, a multiservice arrangement characterized by flexible access capabilities should be established. This can be accomplished by defining a limited but comprehensive set of potential types of information covering all the above mentioned services, and a certain number of customer accessed transmission channels that should carry these information flows on subscriber loops.

Table II lists a set of such information types currently under international consideration, their characteristics and the possible ways they refer to. The envisaged customer accessed channels and their capability in terms of potential information to be alternatively or simultaneously conveyed by each of them, are also shown in the table /3,4,/.

As for the b channel, it is worth outlining that it would be used to convey either PCM adapted data information (d) (e.g. 64kb/s rate adapted to 1 data), or 64kb/s rate adapted to rate voice (f'). This f' information is considered as an attractive opportunity to provide a very low cost telephone service, and a better exploitation of the digital transmission facilities. In fact, after being carried through the exchange at 64kb/s, the f' information can be readapted to its original bit rate and TDM multiplexed on the 64kb/s channels of trunk links. As an alternative, the b channel could be splitted into a number of TDM multiplexed sub-channels, each one having a possibility to carry f' information to different network destinations. This network possibility is one of these types of connection services that still under study.

As for the b' channel, it should be explained that it should be switched according to present standards.

As for the Δ channel, some points are now under discussion, reflecting different views of European Administrations on the matter /5/. Taking for granted that it could be mainly used

and should be primarily designed to carry s information, various countries are planning or evaluating the possibility to exploit this channel to transmit, in a message interleaved way, also t and d' information. Thus it has been agreed that a unified Δ channel communication protocol should be established, covering the needs of all these services and allowing optional use of Δ channel for t and d'. In any case, two focal points of this matter are the Δ channel access for t and d' information and their related traffic and services characteristics. Some study on the subject is being carried-out within CEPT.

Finally, as for the d channel, it is still

at a very early definition stage. In principle, it should carry t and d' information but, when used in combination with the analog channel a, it might also carry some s-information. Thus, an important feature of this channel is its functional compatibility with the Δ channel.

4. MULTISERVICE CUSTOMER ACCESS TYPES

From the foregoing, it can be concluded that the customer access to the ISDN can be characterized in terms of types of information and number and type of transmission channels.

Considering the various possible transmission channels assessments at subscriber premises listed in tab. III, three main types of customer access can be identified, and namely:

Tab. III - Multiservice Customer access Types.

MULTISERVICE ACCESS TYPES	CHANNELS ASSESSEMENTS AT CUSTOMER'S PREMISES
BASIC DIGITAL ACCESS	$b + d$ $b + b' + \Delta$ $b + b + \Delta$
EXTENDED ACCESS	$n \cdot b + \Delta$ $n > 2$
PRAGMATIC (HYBRID) ACCESS	$a + b$

i) a so-called "basic digital access" comprising an aggregation of b channels, suitable for present local area transmission and distribution, and one serving Δ channel;

ii) an "extended access" catering for PABX access and wideband information services;

iii) a so-called "pragmatic (or hybrid) access"

Tab. II - Multiservice Customer Access Capabilities

INFORMATION TYPES			CHANNEL TYPES		CHANNELS INFORMATION CAPABILITY
REF.	TYPE	DEFINITION	REF.	DEFINITION	
a	ANALOG VOICE	VOICE-BAND ANALOG INFORMATION INCLUDING CONVENTIONAL TELEPHONE SUBSCRIBER STATIONS, POSSIBLY INCLUDING DECADIC PULSING OR MULTIFREQUENCY SIGNALLING	a	CONVENTIONAL ANALOG VOICE-BAND CHANNEL	v
f	DIGITAL VOICE	DIGITAL VOICE INFORMATION AT 64KB/S CORRESPONDING TO CCITT RECOMMENDATION G.711			
f'	LOW RATE VOICE	DIGITAL VOICE INFORMATION AT LESS THAN 64KB/S (E.G. 16 OR 32 KB/S) USING LOW RATE CODING ALGORITHMS	b	64KB/S SYNCHRONOUS DIGITAL CHANNEL	$f/d(b)/f'(b)$ e.g. $m=4$
d	DATA	DIGITAL INFORMATION CORRESPONDING TO CIRCUIT AND PACKET SWITCHED DATA SERVICES ACCORDING TO CCITT REC. X.1 OR TO OTHER TYPES OF NON-VOICE INFORMATION (E.G. FAX, SLOW SCAN VIDEO, ETC.)	b'	LESS THAN 64KB/S DIGITAL CHANNEL REPRESENTING ONLY FOR TRANSMISSION PURPOSES A TRUNKED VERSION /1/ SUITABLE RATE (E.G. 8KB/S) OF THE b CHANNEL	d(b')
s	WIDE BAND	DIGITAL INFORMATION AT n*64KB/S REPRESENTING FOR EXAMPLE BROADBAND AUDIO SIGNALS, HIGH SPEED NON-VOICE SERVICES (E.G. FAST FAX, VIDEO TELEPHONY OR STILL PICTURE TRANSMISSION)			
s	SIGNAL LING	BASIC CUSTOMER-NETWORK SIGNALLING INFORMATION FOR CONTROL AND MONITORING OF NETWORK RESOURCES	d	ADDITIONAL MESSAGE-ORIENTED DIGITAL CHANNEL (8-16KB/S) PRIMARILY DESIGNED FOR INFORMATION	s, t, d'
t	TELEMETRY	MESSAGE-ORIENTED DIGITAL INFORMATION AT VERY LOW BIT RATES CONVEYING FOR EX. II) CUSTOMER ALARMS, III) REMOTE METER READING, III) OPINION POLLING, IV) SIGNALLING FOR REMOTE CONTROL AT CUSTOMER'S PREMISES			
t'	RESTRICTED DATA	NOT YET STANDARDIZED DIGITAL DATA INFORMATION UP TO 8KB/S IN FORM OF PACKET-TYPE SHORT MESSAGES SUITABLE FOR INTERACTIVE COMMUNICATION BETWEEN CUSTOMERS OR CUSTOMERS AND NET-PROVIDED RESOURCES	d	DIGITAL CHANNEL FUNCTIONALLY COMPATIBLE WITH s AND CARRYING t AND d' INFORMATION	t, d'

a = STATISTICAL MULTIPLEXING f = TIME MULTIPLEXING / = ALTERNATE ACCESS d(b), d(b'), f'(b) = RATE ADAPTED INFORMATION

based on the use of the a channel supported by one d channel.

Along with the extended access, whose impact on the ISDN will likely be marginal, in the future the attention will be mainly focused on the basic access. Nevertheless, some attention should also be taken also of the pragmatic access, which seems an attractive solution during intermediate steps in the evolution towards the ISDN, even for customers requiring basically the telephone service: the analog subscriber line will be conveniently retained.

BASIC CUSTOMER ACCESS

Functional and physical arrangements and interfaces

All the alternatives for the basic customer access at subscriber premises listed in Tab. III are functionally equivalent, since they can rely on the same b and d channels operating in parallel.

In fact, irrespectively of the channels arrangement type, fig. 3 shows the functional layout and the related interfaces at customer premises and local exchange termination for this type of access. A, B, C, D are functional/physical interfaces, defining some standardized linkages between subscriber terminals, network equipments and transmission units.

While the C interface is a physical interface catering for line transmission functions performed by the Line Terminal (LT), the B interface (that can be either functional or physical and that in any case is functionally equivalent to the D interface) is the interface between line transmission and network termination functions. It provides for the basic access logical functions according to the b and d channels mode of operation so as to define a standardized access for any type of subscriber terminals arrangement /6/.

Concerning with the subscriber terminals interfaces, in view of providing flexible multi-terminal in-house arrangement at subscriber premises (e.g. terminal portability, installation flexibility etc.), the present international debate is evaluating the possibility to develop a service independent "ISDN compatible" physical and functional interface Ax to which any type of ISDN new terminal (digital telephone, multiservice equipment etc.) can be directly connected. The main objective of the interface Ax relies on its functional compatibility with the interface B so that terminals directly connected to the interface Ax separately provide 64kb/s and 16kb/s transmission flows for b and d channels respectively.

As shown in fig. 3, in case of existing equipments, appropriate Subscriber Controls

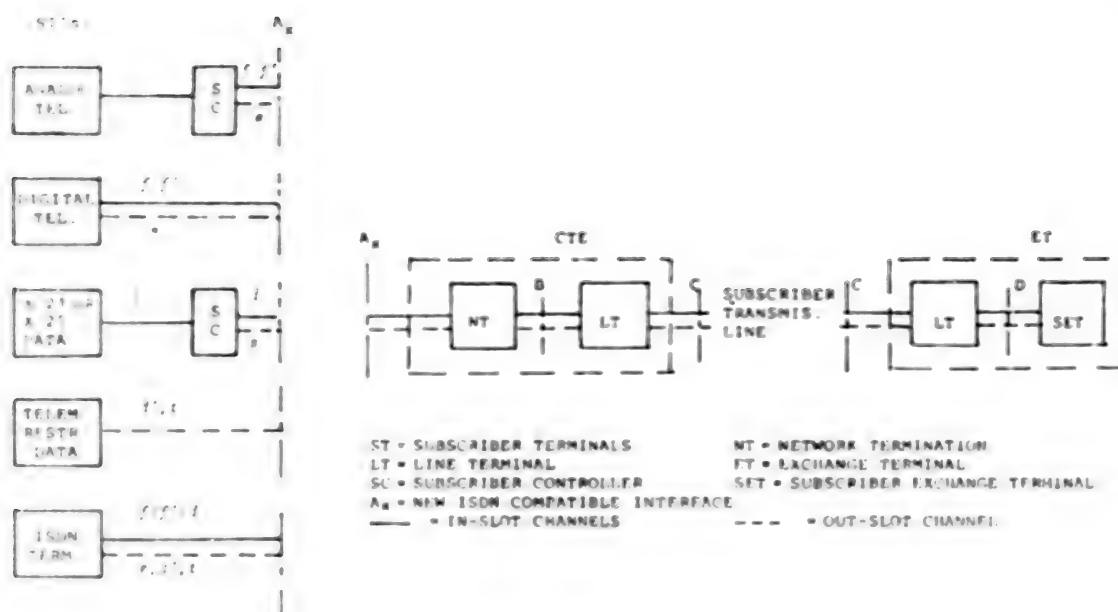


Fig. 3 - Basic Customer Access Functional Structure and Interfaces.

SC's should be used to map their service independent interfaces to the ultimate A_x interface.

In case of terminals providing analog telephony (e.g., SC's) would perform information assessment on b and Δ channels by means of

Tab. IV - Possible Information Types Assessment at Subscriber Interfaces.

INTERFACE TYPES INFORM. TYPES	TELEPHONE ANALOG INTERFACE	X.21	X.21 DIS	X.25	A _x
V	X				
f, s					X
d		X	X'	X	
e, d'					X
f, d, s, e, d'					X

signalling and signalling translation according to the Δ channel protocol.

In case of CCITT X.21 data terminals, SC's would perform:

signalling information handling and translation from in-slot to out-slot channels and vice-versa;

rate adaptation of information flows on b and Δ channels.

In case of CCITT X.25 DTE's exploiting the Δ channel, the network PS facilities would be organized according to a "hot line" technique (Fig. 6). The SC's would set-up the semipermanent 64kb/s connection through the ISDN by

issuing on the Δ channel the call request signal as soon as the related service request condition is detected on the DTE X.25 interface (e.g. C wire "On" of fig. 7).

A possible mapping of information types at different customer interfaces is summarized in Tab. IV.

5.2 Basic Access Functional Features

In the ISDN basic access development, two primary technical problems are involved and namely:

- 1) protocols and procedures to operate b and Δ channels at interfaces A_x and B;
- ii) A_x interface functions and architecture.

These two problems are strictly related. In fact, while the b channel is in principle handled transparently by the Network Termination (NT), the Δ channel, catering for customer-network communication either to establish physical connections for b channels either to convey new telecommunication services, can or can not be processed by the NT. In the latter case the NT only performs electrical adaptation between the interfaces A_x and B, ("transparent" NT), while in the former case it also performs some communication processing functions ("intelligent" NT)/7/. So, customer-network communication functions and some functions of the interface A_x are depending on the Δ channel protocol.

5.2.1 Channel Protocol

The Δ channel protocol functions can be structured into three hierarchical levels:

- i) the level 1, including mainly Δ channel access, transmission and synchronization;
- ii) the level 2, concerning with the procedure LAP- Δ , regulating the transfer of the various information flows (s, t, d') on the subscriber line;
- iii) the level 3, concerning with the processing of the customer-network messages.

As for the level 1, it should be observed that it may not be standardized, since the B interface can be only functional, especially when NT and LT are implemented in a single equipment. In this case it is assumed that the level 1 only standardized feature is the subscriber channels assessment (e.g. $b = \Delta$, $b = b + \Delta$, $b = \Delta$).

As for the level 2, the preliminary indications on the LAP- Δ procedure make it appear to an HDLC type of protocol close to that one specified for the X.25 LAP-B. However, an important difference with respect to this standard lies on the fact that in this case the requirement for multiple LAP capability is met, so as to operate a number of different LAP's by including in the address field of LAP frames some information type (e.g. V=10,11). In fact, signalling (s) will refer to exploit a minimum complexity LAP- Δ (LAP- Δ_s), while data information (d') a greater complexity one (LAP- Δ_d), perhaps conforming to the X.25 LAP-B mode of operation (LAP-V). Telemetry information (t) could require a specialized LAP- Δ_t , though, in principle, the minimum complexity features of LAP- Δ_s will be also suitable to most telemetry

Table 1 - Example LAI-A Protocol Main Features.

FEATURES	LAP A	LAP S
LINK INITIALIZATION/REACTIVATION	SABM, UA, DISC, DM	
ADDRESS FIELD	SERVICE IDENTIFIER TERMINAL EXTENDER IDENTIFIER (IF REQUIRED)	
INFORMATION TRANSFER	$I(N_s, N_r), PR(N_r)$	$I(N_s, N_r), RR(N_r), RNR(N_r), REJ(N_r)$
WINDOW SIZE	1	8
TYPE OF ACKNOWLEDGMENT	POSITIVE-RR	POSITIVE-RR NEGATIVE-REJ
REARMSUP RECOVERY	FRAME RETRANSMISSION AFTER TIME-OUT EXPIRY	

services.

In any way, the multiple LAP capability could rely only on the use of three types of LAP's. This would involve the implementation of an "intelligent" NT since information flows of the same type issued by different subscriber terminals would be first multiplexed by the NT and then conveyed using the corresponding type of LAP- Δ . Thus, the LAP- Δ operating at the Ax interface does not correspond to that operating at the interface B.

Nevertheless, the multiple LAP capability could also be operated by including in the LAP frame address field some terminal address indication. This would allow to operate a number of independent LAP's, each one being identified by both information type and terminal address indication. This solution would not involve in principle any NT processing, so the same LAP could be operated at Ax and B interfaces ("transparent" NT).

As for the level 3, it consists in processing the customer-network service specialized information field. Signalling information processing for the establishment and disconnection of in-slot 64kb/s channels is likely to be similar to that used in the X.25 packet level for virtual channel set-up and release. The processing of message-oriented data information (d') is also likely to conform to the Virtual Call (VC) X.25 packet level procedure since d' services are suitably designed to exploit the ISDN PS resources. The processing of telemetry information, that is also suited for PS, will likely draw advantage from some optional PS facilities like:

- i) the Permanent Virtual Call (PVC) facility for services requiring nearly continuous interactions (e.g. telecontrols, alarms, monitoring, etc.);
- ii) the Datagram (DG) facility for services involving aperiodic low-volume bursty traffic (e.g. meter reading, opinion polling, ...).

5.2.2 Ax Interface

As concerns the interface Ax, the following points are emerging from the international debate /9/:

- i) from the physical point of view, the european feeling is towards the definition of a unique recommendation covering all cases

of subscriber terminals in-house configurations. In other words, customers should not be aware of anything existing between their terminals and the local exchange.

Fig. 4 shows that the interface Ax should be defined such as to permit flexible operation in both distributed and clustered in-house arrangements. However, as an example, the possible use of the interface Ax to access some private local communication systems is also shown in the figure.

From the functional point of view, it is worth outlining that:

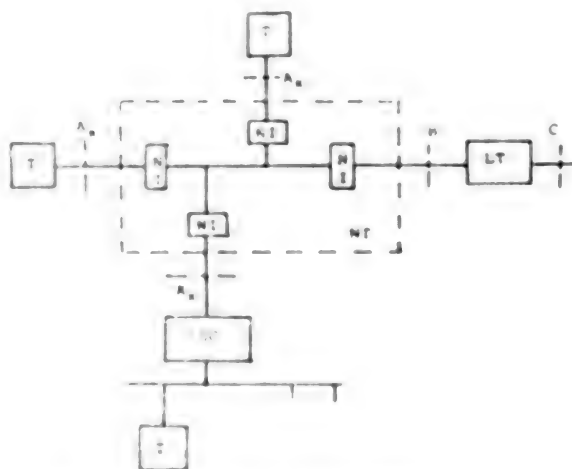
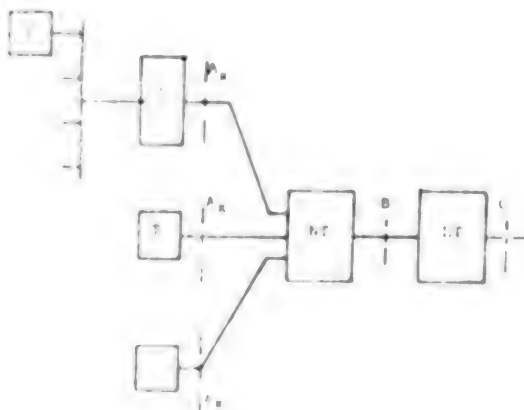


Fig. 4 - DISTRIBUTED IN-HOUSE ARRANGEMENT



DI - CLUSTERED IN-HOUSE ARRANGEMENT

T - SUBSCRIBER TERMINAL
NI - SOME NETWORK INTERFACE FUNCTIONS
LT - LINE TERMINAL
SC - SUBSCRIBER CONTROL

Fig. 4 - Distribution Schemes for IN-HOUSE Arrangements.

- as for the subscriber access to the Δ channel, a contention to this channel would arise if different terminals wish to access this resource simultaneously. As a consequence, the structure of the interface Ax should allow each terminal to be able to indicate its request to send a message and to receive some indication about the permission to do so. This indication could be achieved by means of some dedicated interface connections or some logical level indication;
- as for the subscriber terminal access to the b channel, no contention would ever arise since this access is regulated by suitable signalling procedures on the Δ channel.

6. BASIC ACCESS NETWORK OPERATION

This section presents a first approach to some general proposal on possible procedures for data communications handling through the ISDN via the basic customer access.

In the following, for sake of simplicity, only the $b + \Delta$ option will be taken into account however the procedures herein described will remain basically unchanged also in the case of other access arrangements ($b + b + \Delta$, $b - b' + \Delta$).

As mentioned in Sec. 2, it is assumed that the CSF also supports semipermanent or switched access to either specialized or integrated PSF's. /11/. In both cases, though different local exchanges architectures are involved, the integrated out-slot signalling could be also used to set-up in-slot channels to the PS facilities. Once this access is established, the appropriate in-slot signalling is operated between the subscriber terminal and the PS equipment. This technique is often referred to as the "double call" method for in-slot PS data communication.

6.1 Specialized Switching Facilities

Fig. 5 shows the possible local exchange functional architecture. The 64kb/s Δ channel, alternately used for voice or data information, is switched to set-up either CS communications either the access paths to data facilities according to the call facility indications included in the subscriber call request. Note that in the case of the access to the PSF, the call request signal does not include the called party address field, but only the PS facility indication (CR' signal in fig. 7).

Message-oriented information (t, d') operated on Δ channel, will be provided with a semipermanent access to PS facilities. These types of information, drawn out by the Δ channel Handler (Δ H) where the level 2 processing is performed, are delivered to the Message Handler unit (MH) where the appropriate level 3 functions (VC, PVC, DG) and the statistical multiplexing of a number of these information flows will take place. Then the resulting 64kb/s multiplexed link could be semipermanently connected through the PCM switching network to the specialized PS facilities.

As a last remark to fig. 5, it should be stressed that the ICCS conforming to the CCITT No. 1 standard allows to use the CS network to convey also some new form of data communication (e.g., low bursty traffic telemetry information - just exploit the CCS "datagram like" communication facility to access some centralized network processing centers). ICCS is also an essential feature to support the use of Digital Speech Interpolation (DSI) and statistical multiplexing of CS framed data for 64kb/s channel on long distance transmission facilities.

Fig. 6 displays the overall network signaling sequence for a successful CS call (for data or telephony). Just the out-slot signaling flow at the higher level is shown in the figure.

Fig. 7 shows, instead, the double call request procedure for accessing, via the 64kb/s channels, specialized PS Units (PSU's) performing packet assembly-disassembly or nodal switching functions. PSU's can be allocated in the same digital exchange framework and interconnected among themselves and with specialized PS Data Networks (PSDN's) by means of digital trunk links at the standard digital hierarchy bit rates (e.g. 2.048 and 8.448 Mb/s).

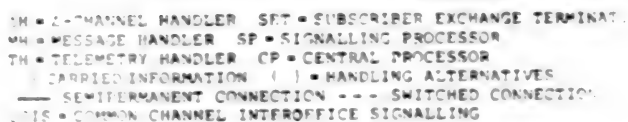
In the figure, the ISDN/PSDN internetworking for a data communication between two present X.25 data terminal equipments (DTE's) is taken

into consideration. As soon as the calling terminal becomes active (hot line access), a CS 64kb/s channel is first established through the ISDN to the PSU by means of a CTE-generated out-slot CR' signal and via the ICCS. The through-connection condition with the PSU is detected by the reception of in-slot flags. Then, the standard X.25 level 2 (LAP-B is shown as an example) and lev. 3 protocols can take place to set-up virtual circuits in the PSDN. Virtual connections and physical customer access paths to PSU's can be also independently released.

6.2 Hybrid Switching Facilities

Present trends in the implementation of local/transit PCM exchanges by using multimicroprocessor technology allow enhanced modular architectures that can easily incorporate centralized Packet Handling Modules (PHM's) performing PS data functions. Fig. 8 shows a typical system architecture employing a path "self-setting" switching matrix among a number of peripheral modules, each of which can be dedicated to various tasks according to the functions sharing and load sharing principle. The peripheral modules can serve as analog/digital customer line cluster, analog/digital trunk clusters, management and operation units and also as a special service units (such as higher level call processors, auxiliary signalling devices, STP processors, etc.). Each module is composed by a hierarchical multimicroprocessor structure in most cases centered around a duplicated central bus to which the following units are attached: high rank processing units (16 bit microprocessors), memories, local peripherals, lower rank busses and processing units (8 bit microprocessors) driving customer lines or trunks, time-division switching devices and input-output devices for modules interconnection.

In such system architectures it is easy to allocate PS functions to one or more modules, hence providing a physical integration of PS facilities into the local PCM exchange. When digital multiservice subscribers connected via their dedicated peripheral modules are requiring PS services, their in-slot channels are routed to Packet Switching Modules (PSM's) via the internal interconnecting PCM devices. Other peripheral modules can be dedicated to information processing functions such as data and voice message handling facilities, text data bases, etc., thus evolving PCM exchanges into true integrated services digital exchanges providing



The diagram illustrates the CS-120N data transfer system. It shows a sequence of operations: ST (Start), CTE (Control Transfer Enable), LE (Link Enable), CS-120N (the central processing unit), LE (Link Enable), CTE (Control Transfer Enable), and ST (Stop). The system is connected to a data bus. Control signals include CR (Control Request), CC (Control Complete), CLR (Control Link Release), CLC (Control Link Complete), IC (Interchange Complete), and CA (Control Acknowledge). A large arrow labeled 'DATA TRANSFER' indicates the direction of data flow.

The 1 channel PS information will be sent and routed to the PHM for the appropriate call handling as shown in fig. 6. In this case the calling terminal CR

In any case it should be noted that there is no true integration between voice and data except for subscriber loop medium; the low rate data channel (δ) could be transmitted either by a data above voice technique or by a suitable digital line coding, so that no signal interference with the voice base-band channel would result. At the local exchange the two channels are separated. While the analog channel a has access to the analog switching matrix, the δ channel is handled by a δ -Handler unit (δ H) and hence by a Message Handler unit (MH) that exploits a dedicated data link to access specialized data switching facilities. (fig. 10)

Some aspects of the customer access and data communication features in future ISDN's as they are emerging from present international debate have been briefly reviewed. It is worth noting however that several important topics such as PABX, broadband and concentrated/multiplexed types of access, local or remote powering

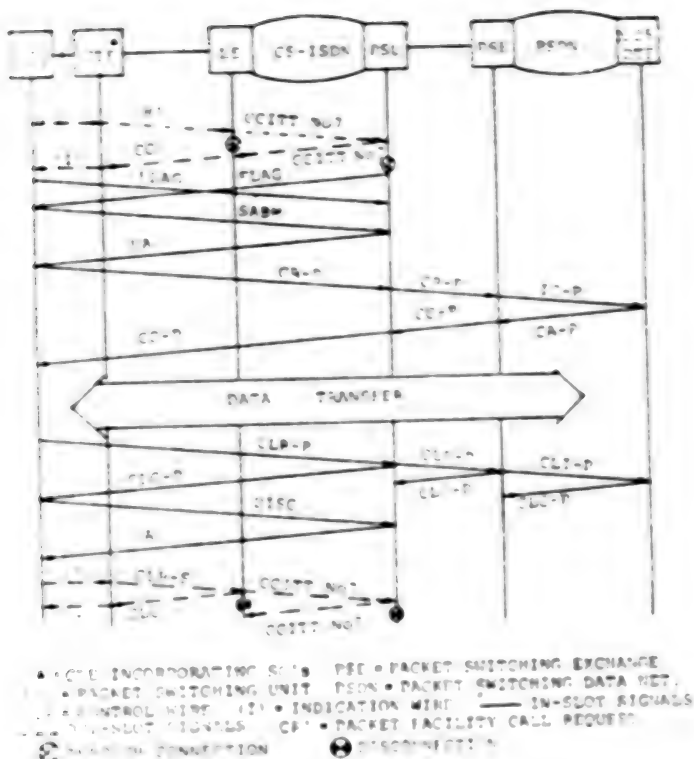


Fig. 1 - Signalling for ISDN/PSDN Internetworking.

techniques for subscriber terminals, performance, maintenance and operation of ISDN facilities have not been even mentioned. As concerns in particular the ISDN evolution, it is also to be outlined the need to set-up appropriate evolving scenarios matching various national environments in developing the approach towards ISDN's final architectures.

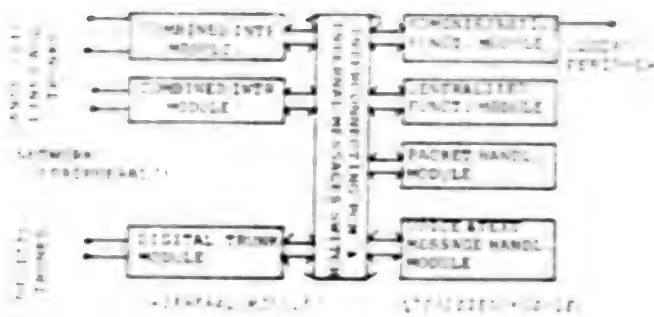


FIGURE 1. DIGITAL SWITCHING SYSTEM ARCHITECTURE.

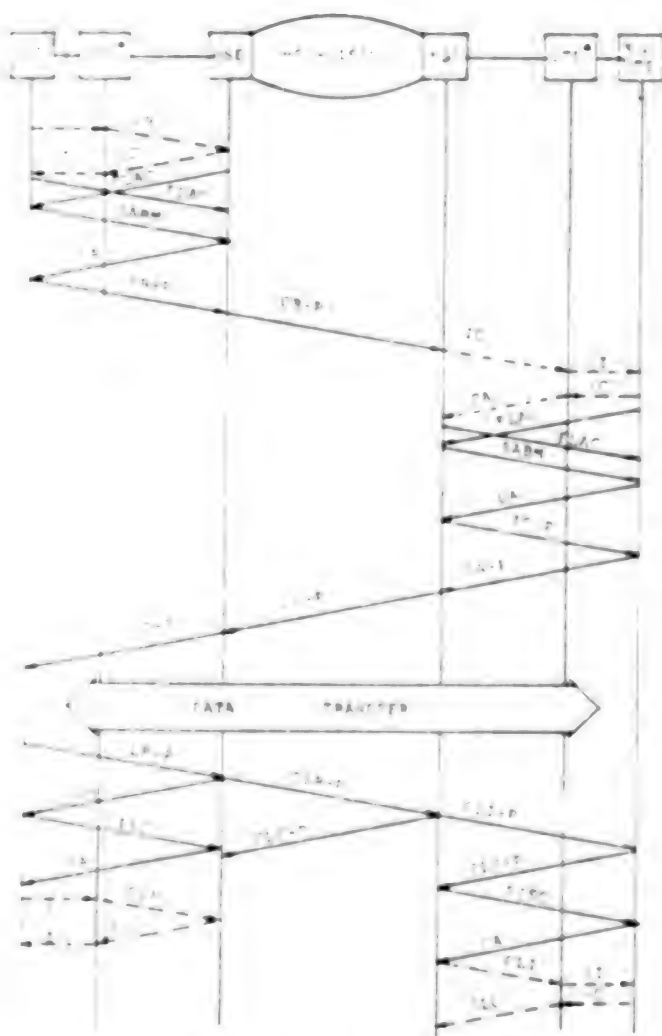


FIGURE 2. DIGITAL SWITCHING SYSTEM ARCHITECTURE.

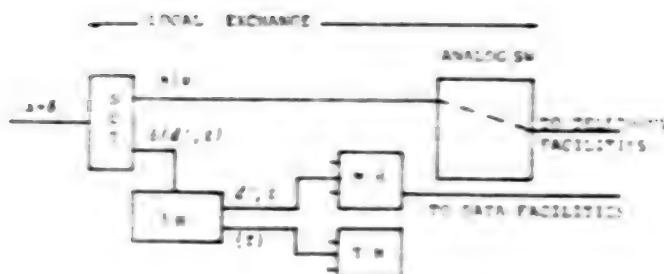


Fig. 1 - Local Exchange Architecture
for the Protocoll/ISDN.

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CSO: 5500/2192

ITALY

DC'S PROPOSED MEASURES FOR TELECOMMUNICATIONS SECTOR

Rome IL POPOLO in Italian 28 Mar 82 p 13

[Text] Statement by Marzotto Caotorta: A Concrete Proposal

On Wednesday, the CIPE [Interministerial Committee for Economic Planning], in approving the telecommunications plan, concurrently addressed the institutional realignment of areas of responsibility of the various operators of TLC services. There exists in Italy today a certain confusion in this regard, with consequent dysfunctions and diseconomies in the provision of these services, as well as delays in the application of new technologies. The DC [Christian Democratic Party] has therefore studied in depth the various problems and needs of this sector, and has drawn up an organic and complete proposal which was set forth by the undersigned on the 23rd of this month in Turin at the Third Seminar on the National Economy, organized by the DC. This proposal is synopsized in the document we publish herewith, which indicates its operative guidelines for achieving, with due graduality though it may need be, an initial intransgressible streamlining of objectives and areas of responsibility, such as will enable a rapid takeoff of modern telecommunications in our country as well. We trust the responsible managements will take due cognizance of this proposal.

Rome--The DC has drawn up a document on the institutional realignment of telecommunications which we publish herewith in its entirety:

"Cognizant of the ever increasing importance being taken on by telecommunications [TLC] in our society and convinced that the growth of our country is also largely dependent upon the efficiency of our TLC services, the DC has undertaken an examination of the situation of that sector, after consulting with friends engaged in it at the various levels of responsibility.

"Considering that technological evolution as well as reasons of economy and effectiveness of planning will lead in the long term to the institution of a unified TLC techniques and services network, a unification of the operation of such services must be provided for in advance.

"Regarding the intermediate term, faced as we are with the existence of dysfunctions and diseconomies stemming from the irrational distribution of areas of responsibility and functions, the situation lends itself to transitory solutions by way of specialized networks, still using the existing trunking facilities of the present network, with segregation of services at local network levels.

"To this effect, there is a pressing need to institute immediately a management of the Italian TLC network that, beyond the reach of corporate pressures or of special group interests, will eliminate duplications and improve the streamlining and economic yield of the network without creating traumas or disservices.

"Within these terms of reference, the DC holds that within the sphere of the functions and responsibilities that are exclusively the province of the Ministry of PT [Post and Telecommunications] the following objectives must be pursued by way of legislative or, where possible, administrative provisions:

1. Institution within the Ministry of PT a new planning, coordinating and control body over all TLC, endowed with the necessary organizational autonomy, to replace the present Inspectorate General of TLC;

2. Transformation of the present ASST [National Telephones State Board] into a 'State Telecommunications Agency' with authority over:

- a) The transmission facilities of the primary national TLC network (cable, microwave, etc);

- b) The telegraph and telex services currently operated by the PT Administration;

- c) The international traffic currently handled by the ASST, with related international switching facilities;

- d) The public telephone stations;

- e) The radiocommunications services presently operated by the news media, as well as those entrusted to the SIRM and TELEMAR companies, without proceeding to the renewal of expired concessions in the case of the latter two companies.

3. Entrust to the SIP [Italian Telephone Company], with a new agreement:

- a) The construction and operation of all the Italian district and departmental telephone networks, including switching facilities at all levels. The ASST's present nine automatic trunk switchers will be transferred to the SIP as and when they are replaced with electronic automatic exchanges under SIP's direction;

- b) The new telephone services;

- c) The data transmission service, reserving to the Ministry of PT the authority to stipulate the type of data that may be transmitted. This authority will be exercised through a special commission to be instituted within the new planning and control body;

4. Modification of the present terms of payment by the SIP for the use of the ASST's primary network, by applying in the case of the SIP the system of a lump sum calculated as a percentage of revenues, which is already in use in the case of Italcable, referred to the total national interurban traffic;

5. Confirmation to the Telespazio Company of its exclusive domain consisting of the installation and operation of all services via satellite made available to the various public and private users;

6. Confirmation to Italcable of its exclusive domain with respect foreign telecommunications links."

9238

CSO: 5500/2187

BRIEFS

NORDIC SATELLITE BILL SUBMITTED--Sweden, together with Finland, Iceland and Norway, will begin preparations for establishing a permanent system of telecommunications satellites. This is the main point in the bill on Nordic cultural cooperation which the government submitted to the Riksdag on Friday [2 April]. It is expected that in the spring of 1984 an alternative decision will be able to be drafted by the parliaments of the four countries, following talks in the Nordic Council. Education Minister Jan-Erik Wikstrom (Center Party) commented that he is very satisfied that the long and difficult negotiations among the countries has led to a positive result. "As the person in the government responsible for cultural policy, I see this as a very welcoming thing that the old desire for expanded Nordic radio and television cooperation can be taken a real step forward." [Text] [Stockholm DAGENS NYHETER in Swedish 3 Apr 82 p 6]

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April 27, 1982